ANNUAL RATES OF SUBSCRIPTION.

Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling.** Members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

VOL. XLI. 1 APRIL, 1934. PART 4.

Event and Comment.

The Dairy Industry.

"DAIRY farming has ceased to be merely an application of manual labour yielding satisfactory results; it is now a combination of energy, skill, scientific knowledge, and economics." That was one of the telling points made by the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, in a brief address of welcome to the Dairy Committee leaders on the occasion of their visit to the Department in the course of the month. Continuing, Mr. Bulcock said that with the idea of giving practical assistance to primary industry, legislation had been passed and applied with the object of enabling the producer to get the best out of his farm along the most economical lines. By taking the line of least resistance it was quite easy to avoid adverse criticism; but it would also be agreed that adverse criticism when soundly based could not be entirely disregarded.

Causes of economic loss in the dairy industry could be roughly classified into three groups—neglect of the means provided for herd testing; the keeping of inferior stock; and animal diseases. Some of the factors contributing to loss of income could be controlled by the farmers themselves co-operating when necessary with the officers of the Department of Agriculture and Stock. Herd recording commended itself as one of the essentials of profitable dairy practice. While there was evidence of a growing desire among dairy farmers in Queensland to adopt systematic herd testing, a disinclination was observable in some quarters to contribute to the carrying out of that work. Discussing matters

relevant to modern dairy practice, the Minister said that if a commodity board were merely a marketing board, then the consumer would be at the mercy of that board. Production, however, could be made much cheaper, and the existence of a commodity board in an industry should be a stimulus to greater efficiency in that industry. Since the year 1931-32, the dairy farmers of Queensland had gained an advantage of £154,576 over the producers of New South Wales, and £218,446 over the producers of Victoria. Last year the advantage over New South Wales amounted to £84,000, and over Victoria to £141,000. Those substantial amounts represented the contributions made by the purchasing public to the dairy industry. Queensland people recognise the necessity of primary producers receiving prices for their products that made conditions of country life reasonably satisfactory; but if they were prepared to pay those prices they had a right to demand the highest degree of efficiency in the industry.

Herd Testing.

CONTINUING his address to the visiting dairy leaders, Mr. Bulcock said that there were 880 herds under official test in Queensland, a very great increase on previous figures. That was evidence of a growing desire to get rid of the "boarder" and build up herds from which a fair financial return might be expected. The distribution of the dairy herds undergoing test was West Moreton, 160; Darling Downs, 260; Central District, 200; Atherton Tableland, 20; and directed through the head office of his Department, 240. Over 700 purebred cows were under official test, a material contribution to the work of dairy herd improvement. He pointed out that no man could succeed unless he was prepared to engage in every possible phase of economic dairy practice; and that was the reason why Local Producers' Associations had been asked to select dairy leaders with the object of their visiting the Department to familiarise themselves with the activities of the Dairy and Stock Branches. Such visits would enable them to appreciate the importance and the value of the work that was being done by his Department every day in the interests of the primary industries of the State. They would also be able to assess the difficulties encountered in the direction of the dairy industry and in the administration of the legislation by which it was governed; and also observe the efficacy and extent of the measures devised for the surmounting of those difficulties.

Herd Improvement.

STRESSING the importance of a continuous policy of herd improvement, Mr. Bulcock referred to the economic losses resulting from the keeping of inferior stock. Everybody, he told the dairy leaders, would recognise the necessity for getting the best dairy stock that was possibly obtainable. There did seem, however, to have been an attempt, by persons seeking party political preferment and others, to assail the policy of encouraging farmers to keep only the very best stock in their dairy herds. Although the precept issued recently on the commodity boards of the dairy industry for the purposes of the "better bull scheme" only amounted to £5,000 a year in all, the State made a contribution equal to the amount subscribed by the industry; but that £1 for £1 contribution by the Government by no means represented the whole of the public money spent on dairy research and administrative work, which, unquestionably, was of the utmost value to the dairy industry.

Stock Diseases.

DISCUSSING economic losses due to the incidence of animal diseases, Mr. Bulcock said that Departmental effort had been persistently misrepresented in some quarters, particularly in respect of contributions required from the industry to assist in the solution of some of the pathological problems which confronted all engaged in animal husbandry. The control of disease required the employment of trained men. In regard to the control of stock diseases generally, the producer had an obligation to the public, for some diseases, such as bovine tuberculosis, were communicable to man; the producer also had an obligation to himself, for heavy economic loss was involved in the milking of diseased cows, which had to be destroyed ultimately. The Minister pointed out that that phase of animal husbandry was claiming the attention of all Departments of Agriculture where dairying was an industry of any magnitude. A sum had been placed on the Estimates by the Government, and a board constituted—after consultation with the dairy leaders of the State—to spend that money judiciously in improving the industry. He stated that he had never asked the board to interview him, unless the board had first expressed a desire to discuss dairying matters with him. There was room, he added, for the extension of the veterinary staff of the Dairy Branch of the Department, for one of the most urgent matters for attention was the control of disease. Dairy inspectors, from time to time, were brought in from their districts to undergo refresher courses at the Animal Health Station at Yeerongpilly, in order that they might acquire or refresh their knowledge of modern methods of disease control and return to their posts as, virtually, field officers of that Station. If the Queensland dairy industry were allowed to remain on the ground it at present occupied, then the industry in other States and other countries would forge ahead of it. Their costs of production would be lower, with the natural consequence of their being able to sell at lower prices. If that happened, the Queensland industry would deteriorate, without their having even the satisfaction of knowing that every effort had been made to save it.

Stabilisation of the Dairy Industry.

MR. BULCOCK concluded his address to the dairy leaders with the statement that the stabilisation legislation passed by the Federal Parliament and the Parliaments of New South Wales, Victoria, Tasmania, and Queensland was the consummation of the desire to establish an Australian price, based on Australian conditions, for dairy produce, in order that the domestic market would not be subject to the fluctuations that had proved so detrimental to the industry generally. The Australian market would be a more profitable market to the producer when stabilisation was effectively established. The Queensland market had been inundated with butter from New South Wales and Victoria—to a greater degree from Victoria—and every pound of butter from the South displaced a pound of their own butter on their own local market. The stabilisation scheme would prevent the dumping of Southern butter upon the local market, unless, of course, it was offered at Australian parity. The Queensland industry would, in consequence, benefit very substantially, but the community, obviously, could not be expected to pay a premium on inefficiency. The Queensland industry must, therefore, safeguard itself against economic loss in the directions he had specified by aiming at the attainment of the highest possible degree of dairying efficiency.

The Call of the Land.

WHAT ST. LUCIA TRAINING FARM IS DOING.

By FRANK W. BULCOCK, Minister for Agriculture and Stock.

THE cry, "Go on the land, young man," is raised in periods of adversity as well as in times of prosperity. It is one of those generalisations that often do more harm than good, for qualification is needed. This qualification should be—"Go on the land, young man, if you have an inclination in that direction." Successful farmers are the product of physique, character, and training, and never in the history of Australia has more attention been paid to these phases of development.

The indiscriminate selection of city youths for country pursuits is doomed to failure, but, given a proper system of selection, there is no doubt that many youths will find contentment and happiness in primary pursuits.

The pessimist is inclined to say, "Why put more people on the land when those already engaged in rural pursuits are not earning a competence?" And it is an argument that warrants serious consideration.

Our Agricultural Destiny.

There are a number of reasons why a State must engage in an active "young man's" land movement under proper conditions. First, if we agree that the limits of production have been reached, then there is no hope in the future for Queensland, in common with Australia generally. We cannot escape our agricultural destiny, and, therefore, must wisely direct it. Wise direction must be the very opposite of the policy of despair that is associated with restriction of land settlement. Rather must we produce with skill and distribute with wisdom.

Queensland is a primary producing State, and, while we are labouring under the cloud of depression, it is natural to expect that our primary industries will suffer, but economic surveys show that these periods of depression alternate with periods of prosperity. One of the great difficulties confronting the statesmen and economists of the world is to regulate the phases of economic interplay and evolve a system whereby a general, satisfactory average shall be obtained. This surely is not beyond the ability of mankind, and agricultural history of recent years shows distinct evidence of stabilisation. Australia can never agree to a policy of general limitation of production, and I believe that this phase, which is associated with present circumstances, will pass away with the passage of the conditions that have given rise to the advocacy of restriction.

The time, therefore, to prepare for the farming future of the State is now, and the material to employ is the youth, both of the country and city. It might reasonably be asked what attraction does a farming life offer over and above the life of an industrial unit in the city? Parents, generally, should weigh that question seriously in defining the future of a son.

Life on the Land.

It is obvious that industry depends on agriculture, and, with the expanding policy of the fulfilment of national requirements within the nation, the expansion of secondary industries depends on the expansion

of agriculture within our Commonwealth. Nor can we assume that in industry every youth will become a captain of industry, but every youth may become an independent farmer. There are periods of anxiety on the land. One cannot minimise the risk of drought, disease, and crop failure, but the farmer has a home, and he is never confronted with that soul-destroying problem of unemployment. This cannot be said for the city artisan.

A survey of present prospects cannot encourage parents to hope for the speedy employment of their sons in industrial occupations, and an additional handicap is the ever-increasing volume of girls and women who now find employment in industry. Queensland has the lands and has the adaptable youth, but the problem of bringing these two together is difficult of adjustment. I believe it lies particularly in an appreciation on the part of parents of the merits of a farm career for their sons, the promotion of a land consciousness and, lastly, a recognition of the channels through which a youth should pass in order to be a farmer.

Training is Essential.

From time to time parents interview me and seek advice as to the wisdom of investing their savings in a farm for a son. Invariably the advice I tender is against this course. A youth without previous training cannot succeed on the land in the way he would succeed were he trained. At one time the most popular expressions to designate the farmer and settler were "cocky," "way back," and "country cousin," each term carrying with it a suggestion of inferiority.

A few years ago it was not popularly supposed that a farmer was a scientist combining skill and resource to wrest a living from the soil. To-day this viewpoint has disappeared, and farming is rightly regarded as a dignified and worthwhile occupation. The farmer of the old school is disappearing and giving place to the younger men, who have an appreciation of and respect for agricultural education and research in all its many phases. Farming is a difficult occupation. It calls for resource, physical capacity, and intelligence. The theory that any man can be a farmer is entirely wrong, but as farming develops the national traits of perseverance and resource we need not fear on this score.

As a compensation for the difficulties associated with farming the Government maintains a very extensive agricultural organisation which is at the service of the farmer on all occasions.

St. Lucia Training Farm.

The question now arises—what should be done to discover whether or not a lad is likely to develop land mindedness? With this end in view the St. Lucia training farm was established. Here, under pioneer conditions, fifty boys are put through a rudimentary course in agriculture. We have not endeavoured to surround the boys with a luxury of farming equipment to which they cannot aspire immediately in their own enterprise, but we have succeeeded in awakening a land consciousness within the minds of many of our students, who are drawn from unemployed sources, and the demand for these boys is greater than the supply.

We pursue a follow-up policy in regard to our ex-students, and it is satisfactory to note that, in the vast majority of cases, these boys have settled down to farming pursuits in a splendid manner. There is no suggestion that all boys enrolled at St. Lucia are potential farmers, but,

as far as possible, we impress on the boys their obligation to themselves to become independent farmers, when training is complete and opportunity offers.

The boys who leave St. Lucia are not competent farmers, but the aims of the farm would be defeated if we sought to turn out a batch of farm labourers. St. Lucia is a successful experiment in preliminary farm training, and the attention of parents of unemployed boys is drawn to the advantages such a farm offers, combining as it does both training and the distinct promise of employment.

One of the great handicaps to engaging in farm pursuits is the problem of finance, and in order to meet this difficulty the Agricultural Bank was established. Under various managers it has made a material contribution to agricultural finance and stability. In addition to the bank's ordinary programme there was placed on last year's Estimates the sum of £50,000 for the purpose of assisting persons who do not fall within the category of those who are qualified for assistance from the bank. This fund has been of great assistance to many persons who required short-term credit for small amounts to tide them over occasional periods of adversity.

These things are mentioned in the hope that youths may realise that the State is prepared to find finance for the settler who desires to capitalise his efforts, and whilst no "wet nursing" is practised, yet the Agricultural Bank and the Rural Assistance Board are available for the purpose of providing for agricultural finance.

Personally, I believe that the land offers bright opportunities for many of our youths. Let a youngster whose mind is turning to agriculture ask any farmer of his acquaintance if he would abandon farming and take to the hazardous life of an industrial city dweller. I rather fancy the answer will be an emphatic NO!

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

PLATE 105.

CONFERENCE OF MINISTERS OF AGRICULTURE, HOBART, 19TH TO 23RD FEBRUARY, 1934.

Back Row (left to right): Messrs. J. T. Thynne, ————, H. Luckman, R. P. M. Short, J. M. Ward, H. Thompson, J. T. Armstrong, C. G. Savage, L. S. Smith, P. H. Thomas.

Second Row: Messrs. H. C. Smith, E. A. Kendall, Miss Jean Easton, Messrs. G. L. Sutton, R. Wilson, G. D. Ross, F. E. Ward, H. A. Mullett, A. J. Perkins, L. T. MacInnes, R. C. T. Philp, H. B. Barlow.

Front Row (seated): Hons. H. Millington (W.A.); A. P. Blesing (S.A.); H. Main (N.S.W.); A. L. Wardlaw (Tas.); J. Allan (Vic.); F. W. Bulcock (Q.).

Products of the Hive.

By HENRY HACKER, F.E.S., Entomological Branch.

EVERYONE knows that honey is the principal product of the apiary, but it may not be so generally realised that in the hive other products are being handled and manufactured by the bees. The following notes have, therefore, been compiled in order to give some idea of the hive products, their nature, and relative value. As honey constitutes the chief product of the hive it will be considered first, the other products in their order of importance being beeswax, pollen, and propolis.

Honey.

Nectar is the raw material from which the bees manufacture honey, and it consists chiefly of a solution of sugars with small amounts of other materials, including colouring matter, and those ingredients which give to honeys their characteristic flavours.

The field bee derives its supplies from the successive blooms of a great variety of trees, shrubs, and other cultivated and wild plants, of which those belonging to the order *Myrtaceæ*, which include the Eucalypts, are by far the most important in this State.

When first gathered nectar is a thin watery liquid possessing a raw, rank taste. To make from this raw product the wholesome and delicious food which honey constitutes, is one of the functions of the worker bee.

There have been two theories offered to explain how the honey-bee reduces the high water content of nectar to the low water content of honey; these are known as the excretion and the evaporation theories. The first of these is based largely upon the well-known observation that bees carrying nectar often eject a tiny spray of colourless liquid. This was assumed by some of the earlier observers to be the result of a process within the body of the bee whereby some of the excess water was eliminated from the nectar while the bee was carrying it to the hive. Largely as a result of experiments made by O. W. Park, in Iowa, United States of America, it is now known that the evaporation theory is the correct one, and the evaporation of nectar is carried out within the hive. The nectar-carrying bee, upon her return from the field, delivers her load to one or more house-bees, which then put the nectar through a process of kneading with their mouthparts, which apparently reduces its water content and probably permits the addition of enzymes, such as invertase, which are said to be produced by the salivary glands. Park also observed that instead of depositing the entire load in a single cell, the house-bee often distributes it by attaching a small hanging drop to the roof of each of several cells; these small hanging drops present relatively large surfaces from which moisture can evaporate rapidly. Later the droplets are collected, and it is assumed that they are again put through the process of manipulation by the mouthparts.

The evaporation of the nectar is carried to a further stage by worker-bees which station themselves in line near the hive entrance. These, by the continual buzzing of their wings, drive currents of air

into and out of the hive and over the comb surfaces. If the hand is held before the entrance at such a time a strong current of warm air may be felt coming out. The loud buzzing heard at night during the summer time is due to the wings of workers engaged chiefly in ripening nectar. When finally this process is completed, it is found that the water content has been reduced to about 15 to 20 per cent., and that the disagreeable odours and flavours, probably due to volatile oils, have also been driven off. The finished product is stored in cells above and around the brood nest and the main cluster of bees. The work of sealing with waxen caps then goes forward rapidly, the covering being more or less porous. This sealing of the cells indicates to the bee-keeper that the honey is "ripe," and in the right condition for extraction.

Ordinarily honey is judged by its colour, flavour, and density. The very great range in its colour is due entirely to the sources from which it is obtained. The colour varies from almost white, through straw and amber to reddish. It has been known to be blood red, and again to have a greenish tinge, and still be absolutely pure. The aroma and flavour of the honey varies also very considerably. White clover and lucerne honeys are generally admitted to a preference as to appearance and flavour, although many people who are used to the more strongly flavoured eucalyptus honeys consider the former to be rather insipid. It must be noted, however, that lightness of colour alone is no conclusive evidence of superior quality, and honey of the darker colours, as well as honey of the lighter colours, may be of the higher grades and quite suitable for table use. Some of the most prized honeys, as for instance that gathered from orange blossoms, is of very deep colour, while the famous heather honey of Europe is quite dark, and yet no honey stands higher in popular esteem on that continent.

Honey is marketed in three principal forms—extracted or liquid honey, which has been separated from the uncrushed comb by centrifugal force or gravity; comb honey contained in the cells of comb, usually in 1 lb. sections; chunk honey which is sometimes retailed here, in which comb is cut into rectangular pieces and placed in the container with the liquid honey, which, if packed in glass, increases the attractiveness of its appearance.

The very great proportion of the honey produced is the extracted variety. Bees are ordinarily able to produce a larger quantity of honey if they are not compelled to build comb for it, and by emptying the combs and replacing them in the hive, the bee is able in periods of heavy nectar secretion to proceed immediately to the storage of more honey.

The production of comb honey requires much greater skill and experience on the part of the beekeeper, and can only be carried out successfully in limited areas where the conditions are favourable. It should not be attempted in localities where the honey flow is slow or intermittent, where the character of the honey flow is such that it granulates quickly in the comb while it is on the market, or where the honey is dark in colour. Local market conditions in some instances may, of course, be such as to make it seem advisable to produce comb-honey in limited quantities in a locality that is not well suited to comb-honey production, but the beekeeper who expects to produce comb-honey for the general market should first be sure that his is a comb-honey locality.

Almost all honeys granulate or "candy" after a certain time. Those which are high in dextrose or grape sugar will granulate very quickly after being exposed to the air by extraction. Granulation is hastened during periods when there is the greatest difference between day and night temperature. Conversely, the liquid condition may be maintained best by exposure to moderate heat; for instance, a honey which ordinarily granulates quickly may remain liquid for years if stored under a roof exposed to the sun. For this reason, storekeepers commonly keep their stocks on the warmer top shelves of their stores.

The following information relative to the sale of Australian honey in the United Kingdom is taken from a recent report issued by the Empire Marketing Board:—

"The greater part of Australian honey is marketed in England under the label 'Golden Wattle,' the brand applied to the produce of the Australian honey co-operative associations shipped to their agents, the Overseas Farmers' Co-operative Federations Limited.

"The term 'blend' in connection with honey has several shades of meaning. In the country of origin, honey from many farms and apiaries is blended in preparation for export; on arrival in the United Kingdom, honey from different parts of a single country may be blended to produce a standardised representative type; and again, honeys from several countries are frequently mixed or blended together.

"After blending, the honey is placed in small containers for retailing. The most popular type is the glass jar which, with an effective label, presents a clean appearance and shows the clearness and colour of the honey.

"Australian honey was stocked in about 10 per cent. of the London shops stocking honey, and was classed among the less expensive honeys. London prices for the 1-lb. glass jar ranged from 11d. to 1s. 6d., 1s. 3d. and 1s. 4d. being the most usual prices, while the ½-lb. jar was generally retailed at from 8½d. to 10½d.

Manufacturing Demand.

"*Chemists.*—The two pharmaceutical preparations containing honey which are in widest use are oxymel of squill, an important constituent of many cough mixtures, and honey borax. Honey is also widely used in the manufacture of proprietary cough cures, balsams, and lung tonics.

"*Confectioners.*—The products in which honey mostly occurs are chocolates, where it is chiefly used to form centres, but it is also employed in the manufacture of toffee, turkish delight, caramels, and nugat.

"*Bakers and Biscuit Makers.*—Honey is used to a limited extent in the making of cakes, biscuits, rusks, and gingerbread, mainly for flavouring; dark honey is used for colouring certain kinds of biscuit, while honey is said to have a preservative effect in cakes and gingerbread, maintaining in the product a palatable moisture."

Beeswax.

Beeswax is secreted by special glands in honey-bees of a certain age, which are situated on the ventral surface of the abdomen. A reasonably high temperature and a honey flow are necessary for its

production. If the bees are closely watched under these conditions, little pearly discs of wax somewhat resembling fish scales will be seen protruding from between the segments on the underside of the abdomen. These wax scales are scraped off with the spines of one hind leg, then pushed forward and grasped by the front legs and transferred to the mandibles, where they are manipulated or masticated, after which they are applied to the comb. During the process, the bee stands on three legs, the two intermediate legs and one hind leg not in action, while the other hind leg and the two fore legs, in connection with the mandibles, perform the manipulation. Each individual bee removes its own wax scales without any assistance.

At the time a swarm is hived, there is no wax in the hive under natural conditions. The wax secretions, however, become very active, and in an extremely short time the hive is supplied with combs. It is also true, of course, that wax is secreted at any time during the active season, when it is necessary that more combs be built to accommodate brood or stores, provided, of course, that there is room. If a comb is removed from the centre of the brood chamber or from the super, it is replaced as needed, but, as a rule, not so rapidly. The rapidity of the honey flow influences this wax secretion greatly.

Notwithstanding the fact that wax is a more valuable article than honey, it pays the beekeeper of to-day to produce honey in preference to making the bees expend their energies in the production of wax. With modern methods of extraction the honey is removed from the combs, and these are again given to the bees or carefully stored away for use during the following season. The wax which the beekeeper now obtains results from the melting-up of cappings, old combs, or combs exhibiting faults, such as stretched cells, or those having too great a proportion of drone cells.

Beeswax has many uses both in the arts and in commerce, and fresh uses are continually being found for this product. A very satisfactory floor finish can be made by melting 1 lb. of beeswax, and while it is cooling, stirring into it some turpentine, the proportion varying according to whether the mixture is required to be thin or thick. Certain grades of blacking, harness oils, and lubricants require pure beeswax in their manufacture. Large quantities of beeswax in the form of candles are used in churches. The electrical supply business is a large consumer; the windings of the electric wires are soaked in beeswax to prevent their being affected by extremes of heat or moisture. Even the dentistry profession consumes large quantities every year to take impressions in the mouth. Last, but not least, the beekeeper himself is a large consumer as well as a producer of wax.

Pollen.

Pollen is the reproductive substance of flowers, which is transferred from the male to the female portion of the flower or from the male flower to the female flower for the reproduction of the species. Nature has provided various methods for this transfer. Amongst these are flying insects, of which bees are the principal. Pollen is highly nitrogenous and contains necessary vitamins. Nature is always prolific, and provides more than is necessary for reproduction purposes. Bees, as they visit flower after flower, carry the pollen from the anthers and fertilize the styles. In doing this they take a toll for their service, and carry some of the surplus pollen away to their hives to make food for

their young larvæ. When breeding is taking place, the nurse bees convert honey and pollen into chyle food, which is deposited in the larval cells. Pollen is generally yellow or orange in colour, but it may be other colours, such as white, green, or blue, according to the source from which it is obtained.

Pollen may be collected by the worker-bee upon its mouthparts, upon the brushes of its legs, and upon the hairy surface of its body. When the bee collects from small flowers, or when the supply is not abundant, the mouthparts are chiefly used for gathering it. The specialised brushes on the legs are used to remove the pollen grains from the body and transport it to the pollen baskets of the hind legs.

The pollen grains are slightly moistened with honey to make them cohesive, and after the load has been carried to the hive it is deposited by the bee within one of the cells of the comb. It is then packed in the cell by some other worker, which flattens out the rounded masses and adds more fluid to them.

Propolis.

Propolis is known to every beekeeper under its commercial name of "bee glue." Its source has been questioned recently, but ordinarily it is supposed to be collected by the bees from the waxy bud scales and other parts of various trees. In any case, the bees bring it in from the field in much the same manner as pollen. Their uses for it are many; with it the frames are cemented in place, the covers and bottom boards are glued fast to the hive body, the hive entrance is contracted, and cracks are stopped against cold draughts and robber bees. During a recent inspection tour, mounds of propolis were seen on the floor of several hives, and a further examination showed a dried mouse under each mound. The mice had evidently crept into the hives and had been stung to death by the bees, but finding that the bodies were too heavy to drag out, the bees had sealed them to the floor of the hive with a thick coating of propolis. Because it liberates a very pleasant odour while burning, it sometimes serves as a sort of incense, especially for church rites. Much propolis is said to be used in Europe and elsewhere for this purpose, but there is no market for the substance in Queensland.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the Journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Parasitic Worms of Poultry.

By P. RUMBALL, Poultry Expert.

A LARGE number of animal parasites are found in the digestive tract of poultry, some of which cause serious disturbance of the digestive functions, while others are apparently harmless. Those usually met with, however, may be classed as round worms (nematoda) and tape worms (cestoda). The former, by reason of the fact that they are the more common, claim prior attention. Various worms are found in the crop, stomach, gizzard, intestines (both upper and lower portions), and the blind gut. The lastmentioned are responsible for serious losses and are particularly hard to expel. The accompanying plates should give poultry breeders some idea of the extent to which infestation is possible.

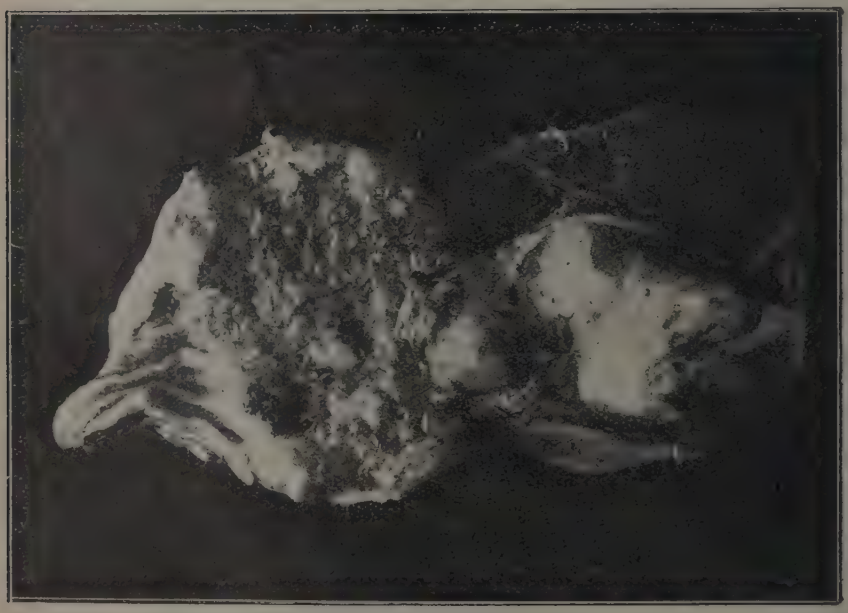

PLATE 106.

The Stomach of a Fowl (left) showing Worm Infestation. By looking closely the minute worms (life size) are easily discernible.

That portion of the digestive tract between the crop and gizzard is shown in Plate 106 heavily infested with worms. These worms were more or less encysted in the walls of the stomach, causing ulceration and eventually rupture.

In this plate the nodules caused by the gizzard worm are illustrated. On examination of the lining of the gizzard perforation will be noticed, and on removal of the lining the end of the worm will frequently be

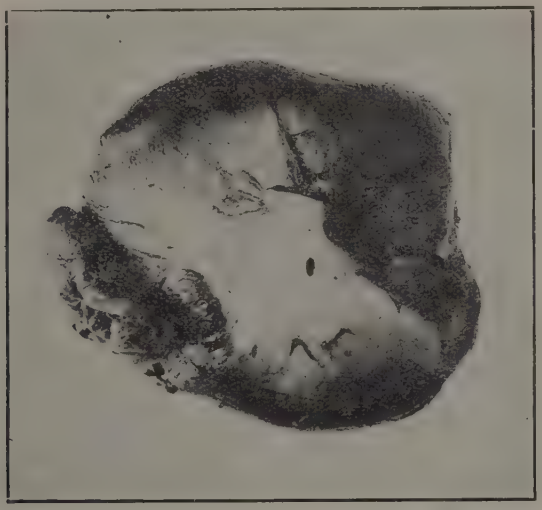

Plate 107.—The Gizzard of a Worm-infested Fowl.

seen protruding from the muscular tissue. They are difficult to extract complete and vary considerably in size.

Plate 108.—Gizzard Worm (natural size).

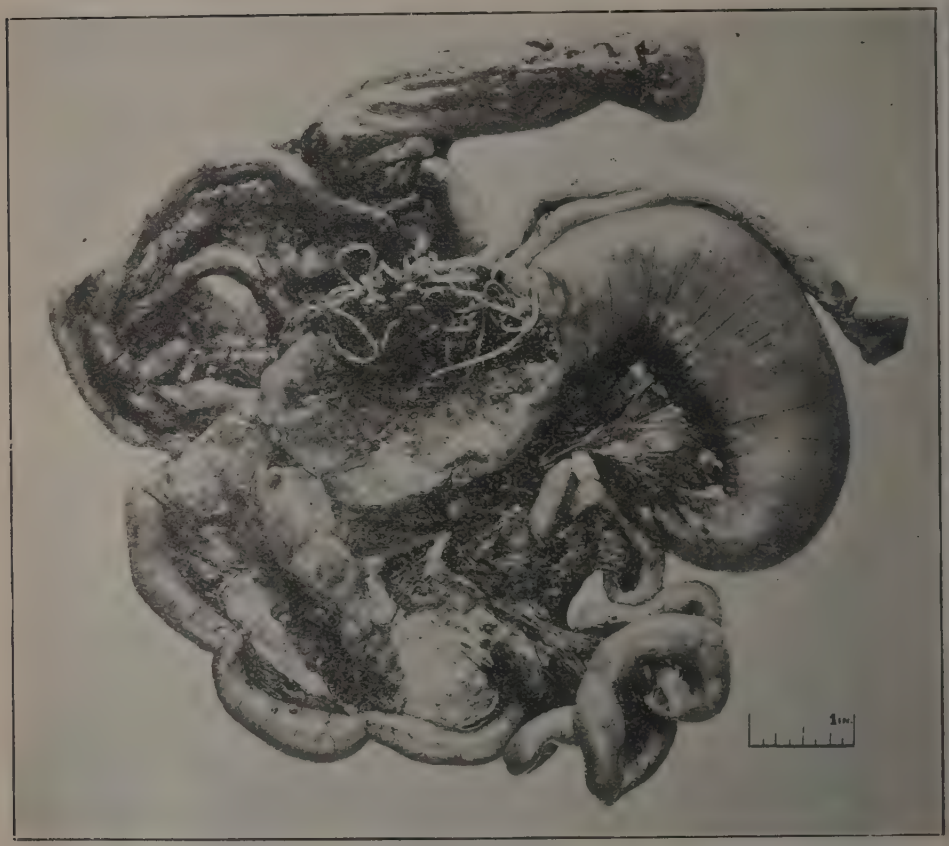

PLATE 109.

INTESTINE OF AUSTRALORP HEN WHICH DIED OF STOPPAGE DUE TO TUMOUR AND BALLING OF WORMS.

This plate illustrates possibly one of the most common of intestinal parasites met with in poultry, and also the harm ensuing on their unchecked multiplication. In all probability the tumourous growth was due to parasitical infestation.

Life History of Round Worms.

It is not intended in these notes to trace in detail the life history of the several round worms found in poultry—in fact, in many cases it is unknown—but it is proposed to deal briefly with those most frequently met with. The adult female worm lays its egg in the digestive tract, which is voided in the excreta. The egg is further developed in the soil, and subsequently enters the digestive tract of the fowl by adhering to particles of food picked up by it. In the digestive tract of the bird it completes its development. For the development of the embryo worm in the soil moisture is necessary, and that is why more general infestation is observed among poultry running in damp yards. After numerous post-mortem examinations, and a study of the environ-

mental and other conditions of the unthrifty flocks affected, one is forced to the conclusion that propagation of certain worms may occur in the infested host itself. A study of the illustration (Plate No. 109) supports this conclusion.

Preventive Methods to Avoid Infestation.

Having a general idea of the life history of round worms, what action can be taken to prevent general infestation? As worms are spread from bird to bird by eggs, infested stock should never be brought on to relatively clean premises. As the eggs occur in the excreta from infested stock, particular attention should be given to the regular cleaning-up of droppings; by doing so you not only assist in preventing the spread of worms, but preserve your fowl manure in its most valuable form. It is impossible to thoroughly cleanse the runs attached to poultry buildings, but they can be spaded over occasionally and, where other accommodation is available, allowed to remain unstocked for a

Plate 110.—Long Worms (natural size) which were Removed from Intestines of Bird illustrated in the Plate on the preceding Page.

reasonable quarantine period. The feeding of all mash foods, foods to which eggs would readily adhere, should be done in suitable containers, and where large numbers of birds are yarded several such containers should be provided to prevent portions of the mash from being spread about the yard.

Worm-infested stock are poor producers, and where infestation is severe the vitality of the birds is lowered, rendering them more susceptible to disease. Young chickens when hatched are of course free, and every effort should be made to maintain them in that condition, particularly during their growing stages. To do this they should be reared on ground which has not been fouled by adult stock. Do not make use of chicken-rearing pens, brooder-houses, &c., as temporary quarters for stock of any kind; by strictly adhering to this principle it is possible to place in the laying pens well developed stock that will give results. On the other hand, if growing stock become infested their growth is retarded and their vitality so lowered that they fall easy victims to diseases of an epizootic nature, such as roup and chicken pox, both of which are prevalent during the growing period and frequently assume a more virulent form with this class of stock.

Diagnosis.

The symptoms which indicate the presence of worms are not very characteristic. The birds become dull, weak, emaciated, and sunken in face, losing all colour both in head and legs. The plumage loses its lustre and becomes roughened. Where infestation is not severe they are ravenous, but with the increase of worms their appetite diminishes, and they have no inclination to look for food. Their walk becomes stiff, and diarrhœa is often present. Generally birds infested with worms have the appearance of suffering from some chronic disease.

Medicinal Treatment.

Too much reliance must not be placed on the ease with which worms can be expelled by medicaments, as the best are only partially effective. Therefore, it should be the aim of the producer to avoid infestation by every means in his power.

Many treatments could be recommended for individual birds, but the capsule method is the most convenient and, at the same time, very efficient. Worm capsules may be obtained in sizes according to the class of bird to be treated.

For flock treatment, tobacco dust at the rate of 2 per cent. in the mash has been found reasonably effective and economical. This quantity might be incorporated in the mash daily for a period of two weeks. After three to four weeks, the treatment might again be applied if worms are numerous. During the period of treatment Epsom salts at the rate of 1 oz. to each gallon of drinking water should be administered once a week, and again at the termination of treatment.

Tape Worms.

Heavy infestation of tape worms is not common, but, although this is so, producers should not lose sight of the fact that when such infestation does occur the consequence is serious. There are many species affecting poultry and there is a great variation in size. Some are so small that a hand lens is almost essential to distinguish them, while others may be found a foot or more in length.

To complete its life cycle, an intermediary host is necessary to the tape worm. One of the known hosts is the slug, another the fly, and another the earth worm.

The method of spread of the tapeworm is as follows:—The ripened segments of the worm are voided with the excreta. The intermediary host feeding upon the excreta where the tape worm eggs are present ingest the egg. The worm egg becomes encysted within the host, there undergoing a portion of its life cycle and completing it when the host is eaten by the birds.

The first line of attack is to remove the intermediary host, for without the host tape worm infestation could not ordinarily occur.

Strict sanitation materially assists in checking the number of worm eggs that are available for flies, slugs, &c., to feed on, and a fowlhouse regularly cleaned is not subject to heavy infestation of flies, while a yard free from rubbish and tufts of grass offers little harbourage for slugs.

Various treatments are recommended for freeing fowls of tape worms. Priority, however, is usually given to kamala. Kamala may be obtained in tabloid form and each bird may be treated individually, or the specific may be given in the mash at the rate of 15 grains per bird. Kamala is most unpleasant to handle, being very irritating, and any person who uses it for flock treatment should smear his hands and arms with grease before incorporating it in the mash. Farmers who have tried kamala in a wet mash state that birds do not relish their meal, and if the flock to be treated is not too large the tabloid form of treatment should be practised. It is certainly efficient and worth the labour entailed.

WEIGHT OF CREAM AND MILK.

What does a gallon of cream and a gallon of milk weigh? There is no legal weight for a given measure of cream or milk. It is generally accepted that a gallon of milk weighs 10.32 lb., and a gallon of cream testing 31.5 per cent. weighs 10 lb.

As the test of the cream increases, the weight per gallon decreases; for instance, 25 per cent. cream will weigh 10.073 lb. per gallon, a 30 per cent. cream will weigh 10.017 lb. per gallon, a 35 per cent. cream 9.963 lb. per gallon, and a 40 per cent. cream will weigh 9.908 lb. per gallon.

While the quantity of cream decreases in weight as the test increases, this is not so with whole milk as it is delivered from the cow. This is due to the fact that as normal milk increases in the percentage of fat, the specific gravity (weight per a given volume) also increases. Although the butter-fat in milk thus lowers the specific gravity of milk, the other solids tend to increase the specific gravity, as it must be understood that as the percentage of fat in milk increases, there is also an increase of solids other than fat, but not in the same ratio as the fat increases.

The milk solids not fat increase with a higher percentage of fat to offset the effect of the fat, with the result that, as the fat percentage of a given quantity of normal milk increases, its weight increases also.

This explanation applies to normal milk of high or low tests as it is delivered from the cow, but would not apply to milk whose butter-fat content has been increased by the addition of cream. Milk is sold to consumers by a measure and not by weight. This procedure is carried out as a matter of convenience and it is, generally speaking, equitable and just.

Chemistry in Agriculture.

By E. H. GURNEY, Agricultural Chemist.*

THE advancement of agriculture is dependent upon the application of scientific principles, and chemistry has been a factor of very great influence in agricultural progress.

Chemistry is very closely associated with all the operations which occur in animal and vegetable life; therefore, it will be seen there are many lines upon which the subject of chemistry in agriculture could be discussed, but on this occasion only very brief mention can be made of the chemistry of one or two agricultural processes.

Considering in the first place the maintaining of soil fertility, it should be said that research into this matter includes investigation of the soil's physical and biological conditions, as well as chemical conditions. In fact, soil research has become such an extensive and specialised matter that publications dealing only with the matter of soil research are in circulation, such as the publication "Soil Science." Study of these matters aid in understanding the fundamental facts of soil fertility.

Composition of Soil.

The chemical analysis of soil shows that it is composed of organic and inorganic (mineral) matter, and upon the analyses of plant life is found to be composed of organic and mineral matter. These mineral ingredients in plants are obtained from the soil water taken up by the roots of the plants. Most cultivated soils contain total amounts of the mineral elements required by plants sufficient for very many crops, but it is fortunate that only very little of this total amount is soluble in the soil water at any one time. If there is sufficient amount of mineral matter in soil water successful crops result—provided other soil conditions are favourable. This sufficiency or otherwise is well shown in the case of a soil on which successful crops cannot be obtained, but upon this soil, after the application of, say, 3 cwt. of superphosphate per acre containing only 70 lb. of soluble phosphoric acid, very successful crops are obtained.

In the analysis of soils, weak solutions of various chemical substances are used for the determination of available plant-food.

The acidity of soil has been well investigated by chemists, and quite a number of methods for its determination are available.

Soil Acidity.

The acidity of soil is of complex nature, but here it may briefly be said to comprise organic and mineral acidity. Organic acidity does not appear to have ill-effect upon plant life to the same extent as mineral acidity. Soil is also considered from its pH—that is, the degree of hydrogen ion concentration of the soil moisture.

Lime is used to rectify excessive soil acidity, but at times both lime and lime phosphate are used. Different plants are not affected in the same way by the application of lime to the soil; thus lucerne for its most successful growth requires a plentiful supply of lime, whereas it has been reported that peanuts are ill-affected by liming. It may be

* In a radio lecturette from Station 4QG.

mentioned here that, besides neutralising acidity, lime improves the mechanical condition of the soil.

The humus (decayed organic material) of soil has been subjected to very extensive chemical research. All the beneficial effects from the presence of humus in the soil cannot be stated now, but it should be said that the maintaining of sufficient supplies of humus in Queensland soils is one of the most important agricultural problems.

As is well known, farmyard manure supplies humus to the soil, Chemists have discovered means of preparing what may be called artificial or synthetic farmyard manure. The results of experiments conducted by Hutchinson and Richards at Rothamsted on the conversion of straw into a manure similar to farmyard manure were published in 1931, and further investigation has resulted in a patented process known under the name of "Adco." It is considered that ultimately the synthesis of humus from crude vegetable matter will be a matter of general practice.

Maintenance of Soil Fertility.

The application of artificial fertilizers is one means of maintaining soil fertility, and it is owing to chemical research that the present-day artificial fertilizers are in existence.

In 1842 Sir John Lawes took out a patent which covered the manufacture of superphosphate. The patent was based on the fact that when bone dust or rock sulphate was treated with sulphuric acid the insoluble phosphoric acid was converted into a soluble form. This may be taken as the initial step in the evolution of the present-day huge "artificial fertilizer" industry, and which has only been made possible by means of extensive chemical research.

Of the usual ingredients in artificial fertilizers nitrogen is of particular importance. Nitrogen exists in the proportion of about four-fifths in the atmosphere, but it is a very inert gas, and in the earlier days of the fertilizer industry there were no means of fixing the nitrogen of the air. But now chemists, with the assistance of engineers, have discovered several different methods by which nitrogen of the air can be made to combine with other elements on a commercial scale.

Briefly, some of these methods are the combination of nitrogen and oxygen at the very high temperature obtained by an electric arc, with the ultimate formation of nitric acid and then calcium or ammonium nitrate; the fixation of nitrogen by passing it over heated calcium carbide resulting in the formation of cyanamide (containing about 60 per cent. nitrolime); the treatment of calcium cyanamide to cause production of ammonia. Such processes as these have certainly lowered the price of nitrogenous fertilizers, but nitrogen is still the dearest fertilizing ingredient to buy.

Chemistry and Crop Production.

Chemistry has been applied to problems in connection with crop production, and the composition of healthy plant growth, as revealed by chemical analysis, indicates to a certain extent the amounts of plant-food required by such plant growth; but it must be remembered the composition of the plant varies at different stages of growth. The analysis of the ash of different crops shows that though the crops all contain practically the same mineral matter the proportion in which the different

elements are present may vary to a considerable extent. In the case of poor crops production, chemical investigation of the soil will frequently show the reason of crop failure.

Animal Nutrition.

In connection with animal nutrition, it may be said this is a matter entirely of chemical nature, for the food consumed by an animal is converted by chemical processes in the animal's body into substances capable of being assimilated by the animal. It will, therefore, be understood that it is only by chemical means that some knowledge has been gained concerning the nutrition of animals.

Analyses of very many of the foodstuffs of animals have been made showing the different nutrient ingredients contained in them. But this is not sufficient, as animals can digest more of some of these ingredients than others, and still further an ingredient in one food may be more easily digested than when contained in another foodstuff. This complication has been met by the chemist determining the digestibility of each nutrient ingredient in many foodstuffs. Briefly stated, the determining of the digestibility of a foodstuff is accomplished by analysing the solid excreted fæces produced from a known amount of foodstuff consumed. The digestibility of food determined in this way has been performed mostly by European and American investigators. The results obtained are termed "Digestibility co-efficients." The animal derives its energy from the food and a certain amount of this energy is required for mastication, digestion, &c., and this energy is deducted when the value of a food for production of milk, &c., is estimated.

It will be seen that animal nutrition is a complicated chemical process, and it is necessary when evaluing foodstuffs to have a means which will take into account these different requirements of the animal. Such terms as "Strach equivalent," "net energy," and "calories," denote the method by which the value of the food has been calculated.

Chemistry and Agricultural Progress.

Only a few items have been quoted as illustrating the assistance that the science of chemistry gives to agriculture, but brief mention will now be made of how chemistry assists agricultural advancement in being what may be termed a protective factor.

For the protection of the agriculturist the Governments have passed different Acts, such as the Fertilizers Act, the Stock Foods Act, the Pest Destroyers Act, and the Veterinary Medicines Act. These Acts provide that any commodity which is covered by any of these Acts must when sold have a label attached stating the composition of the material in so far as the active ingredients are concerned. Samples of material coming under these Acts are obtained by inspectors of the Department of Agriculture and forwarded for chemical analysis for the purpose of ascertaining if the samples are in accordance with the guarantee.

The buyer of material sold under these Acts may have it analysed, providing that the sample is taken and forwarded in accordance with the methods set out in the Act.

Seasonal Notes on the 1933-34 Cotton Crop.

R. W. PETERS, Cotton Experimentalist.

THE cotton season which is now approaching its final stage has been a peculiar one in several ways, and with its peculiarities new problems have resulted, the explanation of which in some cases is simple of interpretation, while in others further investigations are likely to be required, in that most unusually heavy winter rainfall was experienced in all districts except the southern. While this allowed of a welcome replacement of subsoil moisture following on three years of low rainfall, the preparation of the seed-beds was considerably handicapped, especially in the Callide Valley, where the showery conditions continued up to the normal planting time. The main cotton districts were, therefore, planted under most unusual conditions for Queensland, all the land being well soaked, with ample subsoil moisture, and in many cases ploughing was delayed by wet conditions.

General planting rains occurred by the end of September or early in October, and at frequent intervals from then on to the end of November, giving a wide range of time for planting and thus enabling late prepared seed-beds to be planted in good condition.

These conditions caused severe loss of stands in some districts, especially on clay slopes where heavy storm rains were responsible for the washing out of seeds, and in some instances, beating the soil surface so hard as to form a crust, thereby preventing germination.

The main problem confronting the average cotton farmer at this stage was that of weed control, the weeds coming up soon after the cotton rows appeared. The necessity of early cultivation so frequently advised by the Department of Agriculture and Stock was demonstrated in all districts to no small degree, and the results obtained by farmers who carried out this operation clearly illustrated the necessity and wisdom of early cultivation.

The practice recommended by the Cotton Section of the Department of Agriculture, as tested over a period of years at the Cotton Research Station, is to cultivate as soon as possible after the row of young plants is discernible, as this creates a mulch around them and destroys any young weed and grass growth. Riding cultivators, equipped with tines and fenders, are undoubtedly the most efficient implements to use for this operation, but cross harrowing can be substituted if the land is clean of trash, such as old corn stalks, &c.

This initial cultivation, if carried out properly, has a most important bearing on future operations. Not only is hoe work reduced to a minimum where early cultivation is done, but having the field well cultivated and clean early in the season lessens the cost of thinning and the number of cultivations required to grow the crop successfully. Where the fields are cleaned early the usual dry weather at that time kills any uprooted weeds and grass seedlings, and a field in such condition can experience a fairly prolonged wet period without weed growth becoming excessive enough to affect cotton plants. A cultivation made at the first opportunity after any period of prolonged rains then easily controls the tender

weed growth and leaves the field in good condition. Undoubtedly cultivating as soon as the cotton plants are 2 to 3 inches high has a most important bearing on the cost of production and the yields realised, and growers should pay greater attention to carrying out this operation.

Conditions for successful cotton growing continued generally in all the main areas until after the early January rains when hot dry weather prevailed.

In the Southern and South Burnett areas many cotton crops suffered through growers not cultivating immediately after this rain. In some instances this was due to the farmers being engaged in lucerne harvesting, while in others it was thought that the plants were too high to cultivate. The omission of this cultivation has proved to be expensive in most instances, for a hard crust set in the following hot dry period, which not only checked the development of the plants but later allowed the soil to crack badly and thus lose a lot of moisture. Growers must realise that the maintenance of a mulch as long as possible is necessary in the cotton crops. The best soils for cotton production appear to be the clay loams, and where crusts set on these before the plants are so tall as to provide sufficient shade, excessive loss of moisture occurs. Cultivation can be maintained in very tall cotton if done with a walking scuffler drawn by one horse harnessed with long traces and a short spreader. Undoubtedly cultivation should be continued much later than is done by many farmers, especially those on clay loam slopes.

Had the cultivation referred to been carried out, thereby loosening the soil crust, the rapid evaporation of the soil moisture would have been lessened to such an extent that ample moisture would have been available for the roots to absorb a sufficient supply to meet its transpiration requirements.

It is interesting to note this season that cotton planted at the end of September or quite early in October suffered by far the heavier shedding of crop during January, whereas cotton planted later, from the middle of October, suffered relatively little shedding. The probable explanation is that the earlier planted cotton apparently suffered through setting a heavy early crop which proved too great a load for the plant to hold. In the case of mid-October plantings, these were not advanced to such a stage, and were able to withstand more effectively the hot dry period.

It would appear from this that mid-October plantings may be more advisable in most districts, as this procedure would tend to lessen the load of forms that the plants would have to carry during the usual stress conditions in January, and would also delay the opening of the lower bolls until after February, which is often a very wet month.

Picking conditions are generally ideal during March and the rest of the autumn, so that higher grades would be obtained with the later planted cotton.

Similar observations were made in the United States of America a few years ago, where it was found that varieties which set the quickest crop of forms did not produce the heaviest crop. In other words, varieties which put on forms moderately early, but at the same time somewhat sparingly, so that there was a gradual accumulation rather than a rapid setting of crop, finally produced more cotton.

Diseases and Insect Pests.

Diseases and insect pests have not been responsible for any very serious loss this season. At the commencement cutworms caused damage to the young seedlings only in isolated areas, and in many cases these were controlled by the paris green poison bait.

Terminal loss was in evidence again in most areas, and was probably caused by thrips, which destroy the terminal buds by sucking, forcing the plant to send out numerous vegetative branches and causing a bushy growth.

Cotton stainers have been scarce throughout the season with the exception of the false cotton stainer. This has been present in most fields throughout the season, and has in all probability been responsible for a considerable amount of shedding at different periods prior to the dry spell in January.

The corn-ear worm attacked cotton formations during January to varying degrees, and in the Southern area appears to have done considerable damage, probably assisted by a pest somewhat similar in its habits, the rough boll worm.

The only disease manifesting itself to any extent has been the angular leaf spot, which always makes its appearance after rain and has, therefore, under this season's conditions, been expected.

Crop Prospects.

Following the recent beneficial rains which were so urgently needed over the whole of the cotton belt to assist the development of the top crop, it appears probable that a record crop will be harvested. The quality of the crop, provided suitable harvesting conditions prevail, should show a marked improvement over that of the crops of recent seasons, when droughty conditions were experienced generally. It is to be hoped that a crop in keeping with the present prospective yield will be obtained. Not only would the financial condition of a large number of farmers be greatly improved, but a marked relief of unemployment would be afforded through the harvesting, preparation, and marketing of the crop and, in addition to this, a sum totalling several hundred thousand pounds would be distributed in the State from the realisation of the sale of the crop.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

Cotton Growing on New Cultivations.

By W. G. WELLS, Director of Cotton Culture.

THE present phase of cotton growing in Queensland has now extended over roughly twelve seasons, which has been sufficient time to demonstrate the existence of several factors operating here in cotton growing, amongst which is the beneficial result that is obtained from growing this crop on land newly brought under cultivation. In the earlier years of this phase it was thought that cotton could be grown successfully on nearly any kind of soil, but the disastrous results obtained by many unfortunate farmers clearly demonstrated in most of the older cultivated areas a marked limitation of soil types having a high degree of suitability for producing profitable yields under a range of climatic conditions.

Better results were obtained generally in the districts of newer settlements, however, especially in the Upper Burnett-Callide Valley scheme, where cattle stations were opened for selection as agricultural farms in 1924. Demonstration areas had shown that cotton growing was eminently suitable for the general district, and the new settlers mostly concentrated on this crop. During the first few seasons good to excellent yields were obtained, as much as 1,900 to 2,000 lb. seed cotton being realised per acre. Owing to limited capital and the cost of clearing the heavily timbered alluvial country, cotton was grown continuously for several years on the same land, and after a few seasons it became clearly evident that the yields were declining on most of the soils. Less favourable seasons and insect attacks were at first thought to be responsible, but examinations of the soils indicated that changes occurring in their physical and chemical composition were the contributory causes, although the seasonal conditions and insect attacks were the direct agents.

Nitrate Content of Soils.

It was at first thought that the increasing of the nitrate content of the soil with each season's cultivation was the explanation of the rank growth being obtained. These growths were generally attacked by the corn-ear worm to such an extent that little or often no crop was produced. Examinations of some soils showed that the nitrate content in the initial determinations, expressed in parts per million parts of soil, ranged from 7 to 15 parts in new cultivations to 30 and 40 parts in six or seven-year old cultivations. As nitrogen is the plant-food which is necessary to promote good growth of plants, it can be appreciated how the marked increase in nitrates would tend to stimulate rank growth on the richer alluvials.

It was also ascertained that the carbon content of the older alluvial cultivations was being lowered with the continuous cultivation. Carbon is the basic material of all organic matter, such as roots and parts of plants, grasses, &c., so that the depletion of the carbon and the increase of the nitrogen content brought about a lowering in the ratio of carbon and nitrogen. This ratio is a very important factor in promoting the growth and fruiting of a cotton plant, and as the ratio apparently lessened in some soils by as much as 40 per cent., the effect on the soils of the continuous cultivation can be understood.

Effect of Carbon-Nitrogen Ratio.

The effect of this change in the carbon-nitrogen ratio of the soils and the increase of the nitrate content is to make the plants grow rankish with a light amount of fruiting during wet periods. These periods frequently coincide with the occurrence of large populations of corn-ear worm moths, which often find the tender rank growth of the cotton plants attractive places on which to lay their eggs. The resultant broods of young corn-ear worms rapidly destroy first, the young squares, and then later the young and even nearly matured bolls during the latter stages of the life of the grubs. With the removal of the load of squares and small bolls, the plants on the soils with higher nitrate content and low carbon-nitrogen ratio tend to make very rapid development of rank vegetative growth, which becomes all the more attractive to insects later in the season, and often no yields are harvested.

Examinations of crops on new cultivations adjacent to old ones have shown that the plants on the new cultivations can be attacked fairly heavily by corn-ear worm and other pests causing similar damage, and yet good yields can eventually be obtained. Apparently on such crops the proper carbon-nitrogen ratio and the nitrate content of the soils prevent rank growth, and as soon as the attack is over, if climatic conditions are at all favourable, the formation of squares is quickly started and a profitable load of fruit is soon developing, especially where a variety with the ability to produce a heavy top crop is being grown. This phenomenon has been observed many times in all the cotton-growing districts over a series of seasons, so that it undoubtedly pays better to grow cotton on the newer cultivations than on the old ones, particularly on the alluvial heavy loams and clay loams.

The following results, obtained at the Cotton Research Station in the Callide Valley, illustrate very well the gains which may be realised by planting on new cultivations on the more fertile loams:—

	Series J.	Series K.
Average yield in lb. seed cotton per acre from one-year old cultivation	917	1,171
Average yield in lb. seed cotton per acre from four-year old cultivation	501	475
Average yield in lb. seed cotton per acre from eight-year old cultivation	251	436
Gain in favour of new as compared to eight-year old cultivation	666	735
Gain in favour of new as compared to four-year old cultivation	416	696

It will be seen that a heavy decline in the yielding ability of the soil occurred with four years of continuous cultivation of cotton.

Moisture Penetration.

Soil moisture studies made at the Cotton Research Station have thrown further light on the problem of why the cotton crops produce heavier on the new than on the old cultivations. In the 1932-33 season it was ascertained that a fall of 2·94 inches—occurring in two storms, one late in the evening followed by the other early next morning—failed to increase the soil moisture content at the 4 to 6-inch level on well-mulched old cultivation to any appreciable extent. An experiment in the following season, in which the rate of penetration was studied of a

continuous rain yielding 2·46 inches and lasting over twenty-five hours, established the fact that only 35 per cent. of the rain penetrated into the first 18 inches of soil in the old cultivation, as compared to 74 per cent. in the new. Studies made at the Missouri State Station, in the United States of America, have likewise shown a marked difference in the run-off of rains in favour of the more open soils or soils cropped with grasses, cereals, &c.

It would appear, therefore, that greater penetration of rains, especially beating severe storms, will be obtained in the newer cultivations. This is probably another explanation of why heavier yields of cotton are produced on the new cultivations, for with the better and quicker penetration that occurs in such soils there will be a greater washing down of the soluble nitrate, and thus there will be less of them available for the upper root system of the plants while the soils in this area are thoroughly moist. As the greater proportion of the lateral root systems of cotton plants on most of the best cotton soils in Queensland, which are of a heavy clay loam nature, occur in the first foot of soils, the lessening of the nitrates in this area must help materially in controlling plant growth during wet periods.

It is recommended, therefore, that cotton be grown only a few seasons in succession on new cultivations, and then a fresh area of suitable soil be prepared. The most suitable and unsuitable soils for growing cotton in Queensland have already been described in "Cotton Growing," a copy of which may be obtained from the Department of Agriculture and Stock, Brisbane.

Methods of Improving Soils.

It is obvious that on most farms the bringing in of new cultivation for cotton growing cannot be continued for many years, owing to limitation of area. Rotation of crops must, therefore, be practised. A wide range of studies of the suitability of various crop rotations have, therefore, been instituted at the Cotton Research Station to ascertain if it is possible to obtain the same results by growing cotton in rotation with other crops as are realised on new cultivations. Some gains have been obtained through following maize, panicum, and also two cereals, such as wheat followed by maize, especially when the cotton crops have been grown in dry seasons and the cereals in wet ones. Likewise, following fallow has proved beneficial in dry seasons. No results have been secured, however, which would indicate that any of the rotations of cotton and ordinary farm crops will give, over a series of seasons, yields comparable to those usually obtained when cotton is planted on new cultivations.

The good yields of cotton which are generally produced, when brigalow scrub clay loams are stumped, following several years of Rhodes grass, have led to extensive studies being carried out at the Research Station of the possibilities of using Rhodes grass to reduce the nitrate content of the old cultivations sufficiently to reproduce the results that are obtained during the first few seasons of cotton growing on new cultivations. These have not been in progress long enough to allow of definite conclusions being made, except that soil analyses have shown a substantial reduction in nitrates is obtained after two years' growth of Rhodes grass. Instances have been seen, however, in other districts, where cotton following several years of Rhodes grass on rich brigalow clay loams, has produced good yields, although all other cotton fields in the same immediate area have had their yields seriously

reduced through corn-ear worm attacks, which is a common experience on the old cultivations of these districts. In such areas maize, during the first two crops following Rhodes grass of several seasons' growth shows every evidence of a lack of nitrates. With further seasons of cultivation this condition changes and good yields are obtained.

It would appear, therefore, that a Rhodes grass-cotton rotation may be the logical way to overcome the problem that confronts the cotton growers on the older cultivations. This grass is an excellent pasturage for dairy cows, and would, therefore, be valuable to the average cotton growers who also engage in dairying to an appreciable extent. A field of old cotton cultivation could be sown to Rhodes grass and left for three or four years and then planted to cotton for three seasons, when it could be resown with Rhodes grass. Such a rotation would be cheaper and require less labour than where fodder crops are resown annually, and in addition, both excellent pasturage and hay of high-feed value could be obtained.

Rhodes Grass Suitable for Forest Soils.

The idea prevailing in most districts that Rhodes grass does not do well on forest soils has not been borne out at the Research Station. An 11-acre field of very droughty sandy clay forest soil, where summer-grown crops produced very low yields, has given excellent pasturage for seven years to as many as fourteen heavy draught horses a season, through proper rotational grazing.

No difficulty need be feared regarding the controlling of the Rhodes grass seedlings during the first season of cotton cultivation. It has been found at the Research Station that two ploughings with a thorough harrowing after the planting rain prior to sowing the cotton, and then cultivating as soon as the rows of cotton are discernible, allows of easy controlling of future growth, if ordinary practices of good cultivation are followed.

Time of Breaking-up New Cultivations.

It is recommended that the first ploughing of the new cultivation, or of the Rhodes grass on old cultivation, be done prior to the June rains if possible. This will allow of a good penetration to the lower subsoils being obtained which will be of advantage during later dry periods. Experiments at the Research Station have demonstrated that a gain in moisture, equivalent to at least 1 inch of rain, has been obtained in the first 18 inches of soil by ploughing before the June rains. This additional moisture not only has maintained good growth of the cotton plants during adverse periods, but has actually saved the crop under drought conditions in the early stages of growth. A cross-ploughing after the June rains will then leave the soil in excellent condition for preparing a firm, moist seed-bed.

Rate of Planting on New Cultivations.

Owing to the more open type of surface of the seed-bed in the new cultivations, or in fact following Rhodes grass and any fodder crop, it is advisable to plant cotton at a heavier rate than is satisfactory on old cotton cultivations. Experiments have demonstrated that when planting under favourable conditions at a rate of 15 lb. per acre of delinted seed, in rows 4½ feet apart, an appreciable gain in number of seedlings per foot of row can be obtained in favour of the old cultivation. Under conditions of light planting rains an even greater difference may result.

Conclusions.

Cotton growing has been carried out long enough in most of the main cotton-growing districts of this State to develop problems, amongst which is the low yield often produced on the older cultivations. Good and excellent yields are obtained on soils freshly brought under cultivation in these areas, but with continuous cotton growing the yields decline seriously. Rotations with the various fodder and grain crops that can be grown in most of the cotton-growing districts, while indicating some improvement in yields can be obtained, especially in dry seasons, have failed to produce the differences in yields that usually result where cotton crops on old and new cultivations are compared. Results secured by farmers in different districts indicate that a rotation of three or four years of Rhodes grass followed by, say, three cotton crops, may prove to be the most profitable rotation that the farmer who grows cotton and engages in dairying can follow. It is recommended, therefore, that every grower test out the suitability of this practice to his soils. One thing is certain, however, if this rotation is not suitable other ones should be tried, for the continuous growing of cotton on the same land will not yield the maximum return it is possible to obtain on most soils.

FARM TRAINING.

Following is a reprint of a leading article in the Brisbane "Courier-Mail," 12th March, 1934:—

Not only in Queensland but throughout the whole world the agricultural industry is in an intensely serious position. Among the industrial population of the towns there is a popular belief that farmers are by nature, and almost by profession, confirmed grumblers. Possibly there is some truth in the statement, as many of them would admit. Unquestionably, however, the farmers are facing to-day the full force of the blizzard of depression which has been sweeping throughout the world, and it has struck them just as other sections of the community are beginning to emerge from it. The wheatmen, the dairymen, the fruitgrowers, the poultry-breeders, and even the market gardeners are getting for their produce less than its cost of production. This is due not to any local cause, but to the tragic fall in prices in the markets of the world, and the effect is being felt by farmers in every country. In France, within the last two months, millions of bushels of surplus wheat have been fed to stock; and, as suggested in the "Courier-Mail" a few days ago, it may be a good deal better for local farmers to feed their surplus wheat to stock and to poultry than to sell it at a ruinous price in London. The position of the dairymen and the fruitgrowers is equally precarious, and likely to remain so until the nations of the world realise that they must drop their intense nationalism and adopt a policy of trading co-operation.

Queensland is an essentially pastoral and agricultural community, and we cannot afford to be pessimistic about those industries because they are going through a world depression which, let us hope, is coming to an end. As the Minister for Agriculture said in an article in the "Courier-Mail" last Saturday, if we were to admit that the limits of production had been reached there would be no hope for Queensland or for Australia. Queensland's future depends upon the development of its pastoral and agricultural industries, wisely controlled and administered. It would be well if farmers would accept as a sincere statement of fact the assurance that the Government is endeavouring to assist them in every possible way, and that in training lads for agriculture it is thinking of the future. No good service could be gained by ignoring the seriousness of the present position, but it would be a policy of sheer despair to neglect the future or to discontinue the training of farm lads. As Mr. Bulcock said in his article on Saturday, the time has gone when the farmer was a "way-back"; he must now be a trained man, combining practical and scientific knowledge. For such men, despite the present position, there is an immense future.

New Director of Fruit Culture.

MR BARNES' CAREER.

MR. HARRY BARNES, Instructor in Fruit Culture, has been appointed Director of Fruit Culture in the Department of Agriculture and Stock, in succession to the late Mr. George Williams.

The new chief of the Fruit Branch was born in Maryborough, Queensland, in 1904, and was educated at the Christian Brothers High School in that city. After passing the Junior University examination he received an appointment in 1920 to the Department of Agriculture and Stock, and gained administrative experience in different branches of the Department. For two years in succession he served with the Central

PLATE 111.—MR. H. BARNES, DIRECTOR OF FRUIT CULTURE, WHO HAS SUCCEEDED THE LATE MR. GEORGE WILLIAMS.

Sugar Cane Prices Board, accompanying the Board on its annual tours of duty throughout the canegrowing districts of the State. In 1924 he was transferred to the Fruit Branch to perform secretarial duties for the then Director of Fruit Culture, the late Mr. A. H. Benson, M.R.A.C., and was subsequently appointed secretary of the Committee of Investigation into the bunchy top disease of bananas.

In 1926, Mr. Barnes passed the Fruit Inspectors' examination, in which he secured first place; and in 1929 he passed the Fruit Instructors' examination. During the last three years he has been associated with the direction of his branch of the Department; and for the past year he has been carrying out the duties of Director of Fruit Culture in an acting capacity. On his recommendation the following schemes and experiments have been put in hand by the Department:—A citrus budwood scheme designed to improve the standard of the citrus fruits produced in the State. Regulations for the better control of banana diseases (such as bunchy top and beetle borer), and for the more efficient control of fruit fly in deciduous fruits. The inauguration of maturity standards for citrus fruits and grapes. The conduct of experiments to ascertain the relative merits of muriate and sulphate of potash when applied to pineapples. The establishment of a citrus fertilizer plot, for the purpose of bringing about an increase in the bearing capacity of low-bearing trees. The establishment of a Queensland Nut experiment plot at St. Lucia. Experiments with the object of determining the most suitable stocks for citrus trees in the various soils in different districts. Experiments with dates and olives in Western Queensland. Experiments to determine the storage life of lemons.

In addition to gaining a wide knowledge of field practice and problems, Mr. Barnes has pursued a course of study bearing on the scientific side of fruit culture at the Queensland University; and has also, as chairman of the Banana Industry Protection Board and deputy for the Director of Marketing on the Committee of Direction of Fruit Marketing, gained a sound knowledge of the economics of the industry.

TO FAIL AT DAIRYING.

There is a variety of practices conducive to failure at dairying. The following were enumerated in an American paper some years ago, but they may still be relied on:—

Buy any old cow, so long as it is a cow.

Buy the cheapest food, if any, regardless of its content.

Be careful not to test—your grandfather got along without it.

If the cows don't move smartly, prod them with a fork or milk stool—it brightens the animals up.

Milk and feed the cows when the notion strikes you or let them go over one milking; there is nothing in regularity.

Breed your cows to any sort of scrub bull, no matter of what breed, so long as they will freshen once a year or so.

Use luke-warm or cold water for washing dairy utensils (if you must wash them)—it is less hurtful to the germs that lower the quality of dairy products.

On no account wash your hands whilst milking—detrimental bacteria like dirt.

Persevere with these methods—you can depend upon them breaking you in the end.

Strawberry Culture.

Revised by H. BARNES, Director of Fruit Culture.

ALTHOUGH the strawberry is commonly considered to be better adapted to the climate of the temperate zones than to that of the semi-tropics, it is, nevertheless, the one berry fruit which can be grown to perfection in this State. Excellent fruit is produced in our Southern coastal districts and even under tropical conditions such as those existing at Townsville, when the plants are grown on alluvial soil and are well irrigated, very good fruit is produced. This shows that the strawberry has a wide range in this State and that it can be grown successfully over the greater portion of our Eastern coastline and the tableland country adjacent thereto, provided there is either an adequate rainfall or, failing that, a supply of water for irrigation.

The commercial cultivation of the strawberry is, however, confined mainly to those districts possessing a regular rainfall, and extends from the Redlands Area in the south to Bundaberg in the north. When grown under suitable conditions in this district, the strawberry has proved itself to be an early and prolific bearer, able to stand a fair amount of hardship, in the shape of dry weather, and to resist the attack of insect and fungus pests to a greater or less extent.

There is a good demand for the fruit, either for immediate consumption in this and the Southern States or for conversion into jam, and, as few crops yield a quicker return, it frequently enables a beginner to make a living whilst more slowly maturing fruit crops are coming into bearing.

Our strawberries are of excellent quality and carry well, so that they reach their destination in the Southern States in good order when carefully handled and packed, provided the weather is not excessively warm or the fruit over-soft on account of excessive rainfall. The fruit is very suitable for jam, and the product of some of our local factories is not excelled elsewhere in the Commonwealth.

Soils for Strawberries.

Given suitable climatic conditions, strawberries will thrive in most soils, but the ideal soil for this fruit is a rich loam of medium texture, well supplied with humus, possessing perfect natural drainage, and capable of retaining moisture during dry spells—and the nearer one can get the soil to this ideal the better the results. Heavy, cold, badly-drained soils are not suitable, but any good loam or sandy loam, whether of scrub or forest origin, can be made to produce good berries if properly treated.

Preparation of the Soil.

There is only one way to prepare soil for strawberry culture, and that is—*thoroughly*. Nothing else will do. In the case of virgin scrub or forest land, which is, as a rule, fairly rich in humus, the land, after it is cleared, should be broken up deeply and brought into a state of as nearly perfect tilth as possible. On virgin soil, except it is of the poorest nature, it is not necessary to apply any manure for the first crop, as there is usually an ample supply of available plant-food and humus present in such soil, but for subsequent crops, or old land, systematic manuring is very important. Old land that is at all deficient in humus should have that deficiency made good, either by the application of a heavy dressing of farmyard or stable manure, such as a load to every

4 perches, or if this cannot be obtained, then by growing a green crop such as cowpea or other legume which has been well manured with phosphatic and potassic manures and ploughing it in. The green crop so ploughed in should be allowed to rot and, when rotten, the land should be reploughed and worked down fine. If the green crop has received a generous dressing of phosphatic and potassic manure, then there will be no need to apply any further fertilizing material to the land, as a complete manuring has been given; but if not, then the soil should be treated as recommended later on.

The surface of the land should be kept as even and level as possible, and, as already stated, it should be worked down fine, so that when the young plants are set out they will take hold of the soil at once and become firmly established.

Planting strawberries on raw land, sour land, or land that has been indifferently prepared is only courting failure, whereas, when the planting is carried out as advised, there is every chance of success.

Selection of Plants.

Always obtain strong runners from healthy, prolific plants. The first runners next to the parent plants are to be preferred, as they are usually the most vigorous and best rooted, and, further, they come into bearing earlier; but, failing these, well-rooted, strong, well-grown runners from nearer the tips can be used, and although they will not fruit as soon as the first runners they will give a good yield later on, and frequently continue to bear when the earlier fruiting plants have ceased.

Planting.

March and April are the main planting months. Having secured suitable plants trim the roots with a sharp knife to about 3 to 4 inches long, taking care not to let them dry out. Spread the roots evenly when planting and leave the crown of the plant just above the level of the ground. In the following illustrations No. 1 shows a plant set too

No. 1.

No. 2.

No. 3.

No. 4.

PLATE 112.

deeply; in No. 2 the roots are all bunched together so that the plant has not got a firm hold on the ground. No. 3 has been planted too high, whilst No. 4 illustrates the correct depth at which to plant and the manner of spreading the roots.

Plants are usually set with the hand or with the aid of a trowel or dibble. A planting wire is useful aid in keeping the rows straight.

Careless planting is responsible for many failures, especially too deep planting, as no strawberry will thrive if its crown is buried under the soil.

The distance at which to set out the plants varies somewhat in different districts, but it is not advisable in any case to overcrowd them, but to allow plenty of room; 20 inches to 2 feet apart each way is a favourite distance, so that the land can be worked all round the plants, or if row planting is desired, then the rows should be about 30 inches apart and plants set out at from 15 to 18 inches apart in the row. The illustration of a strawberry garden shows the manner of planting adopted by a most successful grower, and it will be noted that the plants have plenty of room and are in no way overcrowded.

Cultivation.

Strawberry plants must only be surface-worked whilst growing or bearing fruit. The object is to keep down weed growth and to prevent the surface of the soil caking; but the cultivation must never be so deep that it will injure the roots. The best implement to use is the Planet Junior hand cultivator or similar machine; or, failing that, a good Dutch hoe of any type that may be preferred.

Weed growth must be kept down and the surface of the soil must not be allowed to become hard and set, as if it does the evaporation of moisture from the soil will be greatly increased, and it will dry out rapidly.

If the plants are to be kept over for a second or third year, then the whole of the runners, other than those required to make good any losses in the original plants, must be removed throughout the season, and the ground between the original plants must be well broken up and manured in late summer or early autumn, so that the plants will be in good heart for producing a crop of fruit the following season.

If the plants have been badly attacked by leaf blight it is a good plan to cut off all the leaves and burn them prior to working and manuring the land, as numerous fungus spores are destroyed thereby. The burning off is best done by scattering a little loose dry straw over the plants when the leaves have been cut off and have dried, and then setting fire to the lot. A light burning does not injure the plants, but is decidedly beneficial.

Mulching.

Mulching is seldom practised in this State, probably owing to the fact that a really good material for mulching is not readily obtainable, and therefore a light soil mulch produced by the surface working of the soil by means of a Dutch hoe, Planet Junior, or similar hand cultivator is all that is necessary. The use of a paper mulch has, however, much to recommend it, as it would certainly keep down weed growth and tend to maintain even soil conditions. A strip of paper mulch 18 inches wide

PLATE 113.—A STRAWBERRY GARDEN ON THE NEAR NORTH COAST.

would be all that is necessary, and the plants should be set through the paper at from 15 to 18 inches apart in the row. A further advantage to be derived by the use of paper mulch is that the fruit would be kept much cleaner, as it would not be so liable to be covered with dirt as frequently happens if heavy rain falls or the watering is not very carefully applied. Some growers use dry grass or straw as a mulch and this practice is also considered a good one.

Irrigation.

Where water is obtainable it should always be available for the plants' use during dry weather, as the ability to maintain an adequate supply of moisture in the soil at all times and thus maintain an even growth will result in larger and better fruit, and a heavy increase in yield. Strawberries pay well for intensive culture, and the money expended in providing a good system of overhead or other method of spray irrigation will be found to be a very profitable investment. A combination of mulching and spray irrigation will enable a grower to maintain a regular supply throughout the season of first-class table fruit.

Manuring.

The strawberry is a fruit that requires an abundance of readily available plant-food, and one that pays well for systematic and judicious manuring. In the 1931 edition of his pamphlet, "Complete Fertilizers for Farm and Orchard," the late Agricultural Chemist to this Department (Mr. J. C. Brünnich) gives the following advice, which it will pay to follow:—

"Some of our coastal country, between the 26th and 28th degrees south latitude, is particularly suitable for strawberry culture, frequently producing quite phenomenal crops. Some of our rich loamy soils found in our coastal scrub lands give the best results. In poorer sandy soils the improvement effected by artificial fertilizers, particularly such containing potash, is very marked, and a light dressing of 5 to 10 tons of stable manure per acre is very beneficial.

"A complete fertilizer for strawberries of the formula 4-8-10 should be used at the rate of 5 to 9 cwt. per acre.

"The following fertilizer mixture may be found useful:—

1 to 1½ cwt. sulphate of ammonia, or nitrate of soda
3 to 5 cwt. basic or ordinary superphosphate
1½ to 2 cwt. sulphate of potash
} per acre;

or,

1½ to 2 cwt. nitrate of soda
1 cwt. fine bonemeal
4 cwt. superphosphate or Nauru phosphate
2 cwt. sulphate of potash
} per acre;

The latter applied by two or three top-dressings, at the rate of 1 cwt. per acre, when fruit is first forming, and thereafter at intervals of two weeks."

Green Crop Manuring.

When dealing with the preparation of the soil, the importance of providing an adequate supply of humus was referred to, and the statement made that where a sufficient quantity of farmyard manure was not

available to supply this essential ingredient to the soil, green crop manuring should be used to make good the deficiency. Humus plays a very important part in the composition of soils, and especially so in those devoted to strawberry culture, as its presence in the soil enables it to retain a much larger percentage of moisture than it would do were it deficient in humus. The power to retain moisture is of the greatest importance in a soil devoted to strawberry culture, as the strawberry is a shallow-rooted plant that soon suffers when there is any lack of moisture.

Moisture in the soil also enables the artificial fertilizers applied to become available, as they are of no use whatever to the crop unless their plant-food is capable of being dissolved by the soil moisture, and can thus be obtained therefrom by the roots of plants. When leguminous crops are grown as a green manure they should be manured with a fertilizer containing lime, citrate-soluble phosphoric acid, and potash; such as a mixture of finely-ground island phosphate and a potash salt, used in the proportion of four of the former to one of the latter. No nitrogen need be applied, as the plants will obtain their own from the atmosphere; and when they are ploughed into the soil it will not only be enriched by the plant-foods contained in the fertilizer applied to the soil to produce the green crop, but also by the nitrogen that has been produced by the green crop itself; the whole forming a complete fertilizer, as it contains all the essential plant-foods in an available form. Green crop manuring is the cheapest way in which to apply nitrogen to the soil, so that, taking into consideration its value as a supplier of humus, it is of the greatest value when intensive cultivation is intended; and as the strawberry is a crop that demands intensive cultivation, its importance cannot be over-estimated, especially in soils that are deficient in humus. Cowpeas, Poona peas, vetch beans, small Mauritius beans, and the large black Mauritius beans are the best legumes for summer growth and vetches or tares and the grey or partridge field pea for winter.

Marketing.

Fruit for immediate consumption should be gathered whilst still quite firm. It should be carefully handled, graded for size and colour, and packed in boxes, trays, or punnets containing a single layer of fruit. It is doubtful if the methods of marketing the fruit in single layers can well be improved upon, as they are less likely to be bruised than if packed in several layers. Fruit for factory use is stemmed, placed in cans or other suitable receptacles, and forwarded as quickly as possible to the factory. Care in handling, picking, grading, or packing, always pays.

Diseases.

The most serious diseases of the strawberry in this State are those of fungus origin—viz., leaf scorch and eye spot.

A pamphlet dealing with the control of these diseases can be obtained from the Entomological Branch of the Department.

Varieties.

Although most of the standard varieties of strawberries have been grown in Queensland at one time or another, experience has shown that no one variety has proved permanent, but that it has been necessary to either raise new kinds from seed or to introduce them from elsewhere.

Varieties producing perfect flowers have proved more profitable than pistillate sorts and are therefore most commonly met with.

After being grown in this State for a few years most varieties become weaker in growth, more liable to disease, and less prolific, so that they have to be discarded. The introduction of new sorts is thus essential, and there is no better way of doing this than by raising local seedlings. Some of the best sorts ever grown in the State have been locally raised seedlings, of which the Aurie, Anetta, and Phenomenal are good examples, and there is no reason why sorts equal or even superior to these should not be produced. Of the well-known standard varieties, such as Marguerite, Trollop's Victoria, British Queen, Pink's Prolific, Federation, Melba, and Edith, and several others that have been grown from time to time in this State, few are now planted. Phenomenal (a Gympie-raised seedling) and Aurie, another variety of local origin, are now the varieties most commonly met with; other new varieties are being tested and some of them may prove to be adapted to our local conditions. The type of strawberry best suited to this State is a vigorous healthy grower—that is, a good bearer and producer or good coloured fruit of good, firm texture and fine flavour; a fruit that keeps and carries well, and that meets the requirements of both the fresh fruit trade and of the jam maker.

As strawberry seed is freely produced and readily germinates, raising seedling plants, which usually fruit the following season, is recommended. By careful selection there is reasonable possibility of effecting improvement on existing varieties. Seed should not be collected indiscriminately but from fruit freely produced on plants showing marked vigour.

FEEDING OF PIGS.

Feeding tests being carried out at the Animal Health Station, Yeerongpilly, in which fifty-five pigs from two months' old upwards are being fed on rations comprising cereal meal, protein meal, minerals, and protein supplements are of particular interest, in view of the comparatively low prices of maize and wheat. These grains and the meals resultant from grinding them are cheap enough to warrant special consideration in regard to their values as pig foods.

A prominent American authority recently stated that under present conditions in Ohio pigs can be fed most efficiently and cheaply by dependence principally upon corn supplemented by protein concentrates from both animal and plant sources, with a limited quantity of mineral matter. Emphasis is given to the value of feeding these different grains in self-feeders, specially provided for the purpose, similar to those in use in the Yeerongpilly experiments.

It is well to remember that the pig, by nature, is a consumer of concentrates; his digestive organs cannot utilise the proportion of roughage or fibre in the ration that milch cows require. Pigs cannot profitably consume more than 9 or 10 per cent. of fibre in their rations, although they will consume more if permitted, but the additional quantity is more or less wasted in the process of digestion.

Brood sows and mature stock may be fed more roughage and fibre than pigs being finished for market. That the system of marketing farm crops on the hoof is practicable is proved by the fact that seven of the corn-belt States in America comprise what is probably the greatest hog-feeding area in the world, the grains used being corn, wheat, rye, and barley, and their by-products.

In feeding these cereals and cereal meals protein concentrates are essential. Animal proteins are usually more efficient in proportion than those from plant sources, hence the world wide preference for milk and milk by-products, and meat meal in particular. One per cent. of the ration may be mineral matters, such as sterilised bone meal, ground limestone, and charcoal. The addition of a small percentage of salt to the rations fed to pigs is payable where the rations are deficient in this mineral. The Yeerongpilly experiments will be watched with considerable interest by all engaged in the feeding and marketing of pigs.

Broom Millet.

Some years ago we were permitted to reprint a bulletin on broom millet by Mr. G. Marks (then Inspector of Agriculture, Hawkesbury Agricultural College), Manager of the Government Experiment Farm at Grafton, New South Wales, and published by the New South Wales Department of Agriculture. In response to numerous inquiries from different parts of the State on the cultivation, harvesting, and marketing of broom millet, it is deemed advisable to reprint Mr. Marks' bulletin again, although in a somewhat abridged form.—Ed.

Requirements of the Trade.

In the manufacture of brooms, three classes of brush are required, which are popularly known as "inside," "cover," and "hurl."

"Inside" millet is used for forming the inside of the broom, and is generally not more than 17 inches long.

"Cover" is the class used for covering the inside and also for forming the shoulders. It is longer than the former, and must be from 17 to 20 inches in length.

"Hurl" is the longest brush, ranging from 20 to 25 inches. It must also be fine and straight, and forms the outside covering of the broom. To give a nice finished appearance, only prime hurl can be used.

About 1½ lb. of brush are required to make an ordinary broom, and the three grades are used in about equal proportions.

The soil, climate, and methods of cultivation determine largely the quality of the brush, but in an average season there would be sufficient of each produced to satisfy the requirements of the trade. When grown under exceptionally favourable conditions, a larger proportion of long brush is produced. It may be used as covers, but owing to its length a certain amount has to be cut off, so that its use for this purpose causes unnecessary waste. On the other hand, a dry season will have the effect of stunting the growth, producing a large percentage of "inside" millet, which can only be worked in the inside of brooms. Manufacturers have consequently to purchase elsewhere to satisfy their requirements.

It is not intended to go into detail concerning the manufacture of brooms, as this does not exactly concern the grower. Manufacturers require certain classes, and the farmer should aim at producing those classes which invariably give profitable returns.

Fully 90 per cent. of the millet produced in New South Wales is grown on the rich alluvial lands of the North Coast: and on several of these rivers—notably the Hunter, Manning, and Richmond—the industry may be looked upon as lucrative and permanent. Many farmers have reported their success with this crop, and would not think of reverting to the far less remunerative occupation of maizegrowing. The raising of millet need not be confined to these districts, as, with the necessary care, and the aid of a few home-made contrivances, any land which produces 25 or more bushels of maize to the acre will yield profitable returns. On many of our western slopes millet should also thrive,

particularly in those localities where irrigation can be carried out. It is advisable, before entering extensively into the production of broom millet, to ascertain from agents or manufacturers the probable requirements of the trade, with the view of obtaining an idea of the prices likely to be obtained during the season. At the same time, should the prices fall after the crop is harvested, the millet may, if properly cured and baled, be stored for a considerable length of time without injury.

The following information may enable beginners in broom millet growing to avoid some common mistakes, and not to neglect any of the important operations which are essential to success:—

What Broom Millet Is.

Andropogon sorghum vulgare is a non-saccharine variety of sorghum. It is an annual, somewhat similar in appearance to maize while young; but it has thinner stems and narrower leaves, and, instead of having male and female flowers on separate parts of the plant, they are both found together in the brush at the top. The flowers are of two kinds —perfect and imperfect. The former are set directly upon the branch, and are accompanied by some of the latter, raised upon little stalks. The fine stems of the panicle or brush are the valuable portions; the other parts are incidental. The brush should be composed of seed stems, uniform in size, length, elasticity, and toughness, and of a nice bright colour. The soil and general methods of cultivation will largely affect the character and quality of the product, even though good seed be used. By long and careful cultivation and systematic selection certain desirable qualities have been developed and fixed, which remain only so long as the conditions which brought these changes about are reasonably observed. When a plant is grown for a particular purpose it should be the cultivator's aim to keep improving it in the direction most profitable to him. This necessitates a careful study of the plant and its requirements, and the conditions which make for its proper development. In broom millet it is not desirable to obtain a heavy yield of seed, a large development of stalk and leaf, or a sap full of saccharine material, but a special and unusual development of the long, thin stems of which the brush is composed. It makes very little difference whether a large plant is produced or a heavy crop of seed is obtained, provided these stems are long and fine.

Class of Land Required.

The soil requirements of broom millet are similar to those of maize. The best results are obtained from the deep, rich, well-drained alluvial lands of our rivers. It is, however, capable of adapting itself to a variety of conditions, and with proper care and attention, sandy and even gravelly soils, if thoroughly drained, will produce fair returns. Undrained lands make the working and cultivation more difficult; the growth is generally slow and uneven, and there is always the liability of the crop becoming stunted and diseased. To ensure evenness in ripening a soil uniform in character and fertility is essential.

Place in the Rotation.

In the general rotation on the farm, broom millet takes the same place as maize. It is not advisable to adopt the practice of growing it in the same piece of land continuously, unless suitable fertilizers are applied. It has been found, however, in dry seasons, that it does not thrive as well on land following millet as where the previous crop was

maize. The reason of this appears to be that, being more drought-resistant, it continues to grow, and thus exhausts the soil of its supplies of moisture and plant-food, when maize would probably cease growing. At the same time, as the brush is usually harvested soon after the flowers have set, the crop can scarcely be classed as a very exhaustive one, particularly if the stalks are cut down immediately afterwards. Where possible, it should follow a leguminous or root crop.

Preparation of the Land.

To obtain the best results, the land must be properly prepared and brought to a fairly fine tilth before sowing. The previous treatment should be such as would destroy weed seeds. The presence of weeds in the early stages seriously interferes with the growth and cultivation of the young plants. Deep ploughing is recommended. This not only ensures greater feeding room for the roots, but it also has the effect of increasing the moisture-carrying capacity of the soil—a fact which must always be remembered, especially in those districts where the rainfall is limited and irregular.

The nature of the subsoil must also be considered. Clays should not be brought to the surface, but can be materially improved by subsoiling. Ploughing operations should be commenced a couple of months before sowing time. This not only allows the land to sweeten by exposure to the weather, but all vegetative growth turned under is generally well decomposed by the time the second ploughing takes place. In early spring the land should be well fined down by means of the harrow, disc, roller, &c.

Sowing and Cultivation.

Sowing should not take place until all danger of frost is over and the soil is thoroughly warmed, so that the seed will germinate at once. September, October, and November are usually the best months. If planted too early, there is not sufficient heat in the soil to cause the seed to germinate, and it will either rot or the young plants will be so weak that the weeds will very quickly outgrow and smother them. It may be sown about the same time as maize, or two or three weeks later, with advantage. Drills 4 or 5 inches deep are struck out with a plough (a double mould-board one is preferable) about 3 or 3½ feet apart, and the seed planted along these by hand or machine. The latter is preferable, as it sows more uniformly; and, by using a fertilizer attachment, chemical fertilizers may be applied at the same time. An ordinary maize seed-drill, which sows and covers the seed in the one operation, is one of the best for the purpose. During hot or dry weather the seed should be sown soon after the drills are opened, and before the soil has had time to dry. When this system is adopted, hilling can be dispensed with. It prevents a great deal of evaporation from the soil by exposing a smaller surface. Besides this, the plants, having their roots deep in the soil, have plenty of support, and are not so quickly affected by dry weather. The amount of seed varies from 5 to 8 lb. to the acre. When the plants are 6 inches high, they should be thinned out to 3 or 4 inches apart for rich soil, and more space allowed each plant in poor ground. With good, clean, and evenly-graded seed, the sowing may be adjusted so that very little thinning is necessary, thereby saving a tedious and rather expensive operation. The quality of the brush is affected to a very large extent by the manner in which this thinning is carried out. If too much space is allowed, the plants grow very strong and vigorous

and produce brush which is coarse and unsuitable for market. On the other hand, if crowded too much they become very fine and weak. To obtain an even crop, it is essential to have uniform sowing and germination, and later on to thin the plants to a uniform distance. Some growers prefer to sow the seeds in "hills," 15 to 20 inches apart in the drills, leaving from six to ten stalks to each. The seed should be covered from ½ to 1 inch deep, the depth depending upon the character and condition of the soil. If it is dry, deeper covering is more necessary than would be the case if the soil were in a good moist condition. Where labour is scarce, several sowings should be made in succession to enable the grower to deal with his crop at regular intervals, and not have the whole area mature at the same time. Rolling the land as the seed is planted ensures a quicker germination and a better stand, particularly if the soil is a little dry. When drilled, the roller at the rear of the machine is quite sufficient. Should heavy rains fall after sowing, and before the seed has germinated, a light harrow should be used as soon as the condition of the soil will admit. When 6 inches high, the crop may be harrowed to keep the soil loose and to gradually fill in the drills, and thus destroy any young weeds. Broom millet makes rather slow growth for the first couple of weeks, and the cultivator should be kept going every fortnight or three weeks, to keep the surface soil loose and friable, to conserve moisture, and prevent weed growth, and in every instance after rains. For large areas, a two-horse spring tine cultivator may be used. When the crop is half grown, under favourable conditions cultivation may cease; in any case the surface roots must not be disturbed by cultivating too deeply. In moist and exposed situations the crop may be lightly hilled, as an extra support is necessary. It is during the early stages of growth that the cultivator is of greatest value, as the soil may then be loosened fairly deeply. The most critical period is when the heads are forming. If dry weather should set in then, the brush will be short and stunted. It may be necessary in some districts to sow early or late in the season so that the crop will not come into flower during such trying conditions. Where irrigation is practised, it is essential to plant in suitably graded land and convey the water by means of open drills between the rows. After each application of water, and as soon as the nature of the soil will allow, the soil must be well cultivated to prevent caking and to conserve moisture.

Manuring.

On soils that are somewhat poor, it is advisable to apply fertilizers. Such crops as cowpeas, field-peas, vetches, and clovers are suitable for green manuring, and may be ploughed under when they have reached the blooming stage or have been grazed off by stock. This latter system works well when mixed farming is carried out, and stock of different kinds are kept. Any vegetable matter should be ploughed under early, to give it ample time to decompose before sowing. Farmyard manure, if available, is also a first-rate manure to apply, as it not only supplies the elements required by the plants, but also improves the mechanical condition of the soil. Chemical manures are also valuable, and are very easily applied. Superphosphate, bone-dust, dried blood, and sulphate of potash will be found the most suitable. The quantities used for maize or sorghum will do equally well for broom millet. The following make

a complete fertilizer, and may be applied at the rate of 2 to 2½ cwt. per acre:—

Superphosphate	80 lb.
Dried blood	64 „
Bone-dust	50 „
Sulphate of potash	30 „

The manures should be passed through a sieve, to remove lumps and foreign substances that would prevent them from passing freely through the drills. They should be thoroughly mixed just before sowing, as, if mixed any great length of time before required, they are very liable to "set," especially if the weather is at all damp, and this necessitates breaking up and rescreening before use. It is impossible to state definitely what quantity of manure is required for each class of soil. Growers would do well to conduct experiments on a small scale with manure, mixed in varying proportions, and to notice which give the best results. Soils, even in one locality, often vary considerably in their chemical and physical characters, and by such tests the farmer may soon determine the most suitable mixture for his land.

An excessive dressing of manure tends to produce a strong coarse brush.

Bending the Heads Over.

The practice of bending the heads over is not carried out extensively in this State, and as a result a large amount of bent brush is sent to market, which can be used only as "insides" or "covers." In many parts of the United States of America this operation is never neglected. When allowed to grow in the natural way, a large percentage of the brush will spread out, and bend over on account of the weight of the seed, and this reduces its market value. This is especially the case if there is good rain when the brush is forming. The rapid growth causes the panicles composing the head to become tender, and unable to bear the weight of the growing seed. Strong winds, at this particular period, will also cause this, and grain-eating birds, when plentiful, are sometimes responsible for a great deal of damage. The illustrations show examples of the brush thus destroyed.

This loss may be prevented by bending the head over, and the weight of the seed in maturing will cause the brush to lie close and straight. The turning must be done between the joints or nodes, as if done on the joints the stem will snap and the top die off. The bending checks the flow of sap a little, but the growth in the head is not materially affected. This operation is performed when the seed is beginning to fill out, and the brush shows signs of spreading.

It should be understood that it is quite possible to grow millet without turning down the heads. Some of the best millet on the market is grown by farmers who do not favour the operation. At the same time, there are seasons when a fairly large percentage is completely spoilt, and such losses could have been prevented by the adoption of this system. The stalks are bent about a foot below the base of the head, and, if the plants are very tall, there may be two bends, as shown in illustration. The heads should hang clear of the ground, so that they will not be damaged by rubbing, or discoloured by the splashing of mud in rainy weather.

Harvesting and Curing.

No matter what care has been bestowed upon the cultivation of the crop, sound judgment must be exercised at time of harvesting. An excellent crop may be brought successfully as far as this stage, and yet the result be unprofitable on account of inattention to, or ignorance of, some apparently unimportant detail. The time to harvest and the various other operations required to prepare the millet for market are such as require some experience in order to do them properly. Even experienced growers are not unanimous on the point of when to harvest the brush, some cutting the heads when in blossom, and others harvesting later so as to obtain better developed seed possessing considerable nutritive value. The time to cut will depend upon the weather and the colour required. Manufacturers generally prefer a millet having a green tinge. It is then much tougher than when allowed to become nearly ripe. To obtain this green colour the millet should be cut when the seeds are in what may be called the dough stage. The brush is then fully developed, but the grain is soft. For some classes of goods a golden colour is preferred, in which case the crop is left till the grain is fairly firm. With a little experience it is easy to harvest a large area, and yet maintain a uniform tint. A strong knife (a pruning knife is very suitable) is used to cut the brush, and at least 6 inches of stalk should be left on. In dwarf varieties the brush should be pulled instead of cut. Select fine weather for this operation. Some growers bend the stalks of drills towards each other diagonally, about 2 or 3 feet from the ground, forming a sort of platform upon which the cut heads are placed to dry. Others cut the whole of the stalks, and lay the millet upon them.

Drying in the Field.

In this State the millet may be properly dried in the field during the greater portion of the summer months. Should thunderstorms occur, the brush must be placed in heaps and covered with tarpaulins, sheets of iron, or other material. The time required for drying depends upon the season, but still, with fine bright weather, two days should be sufficient. The brush must not be allowed to get wet, as rain or dew soon discolours it.

Drying under Cover.

The finest colour is obtained by drying under cover, or away from the direct rays of the sun. The millet is left a couple of hours in the field for some of the moisture to evaporate before being taken to sheds fitted up with racks one above the other, so that the brush may be spread out in layers about 3 inches deep. It must be turned regularly at frequent intervals, and when nearly dry may be placed in thicker layers. This method requires plenty of space and a good deal of attention, and it takes longer to dry.

Removal of the Seed.

The seed is removed by means of a hackler.

The machine consists of a roller studded with small iron spikes, mounted in a frame and made to revolve at high speed. A handful of the brush is held so that the roller comes in contact with the seeds, which are speedily stripped off. A firm at Morpeth specialise in millet machinery, and supply these in hand, horse, or belt power for about £4 10s. and £5 10s. respectively.

For small quantities a handy man can very easily make one, but it is best to purchase one, properly constructed, for treating large amounts.

Grading.

The grading of millet is most important, and must not be overlooked. While grading cannot be done so cheaply or expeditiously on the farm as in the factory, still, in the grower's "own interest, it is essential that some grading be done." It should be sorted into at least three classes —"Inside," "Covers," and "Hurl"; and any which cannot be honestly included in any of these classes should be discarded. Green and golden should also be kept separate.

Baling.

The various grades should be baled separately. For this purpose a press is required. One used for lucerne or other hay can be conveniently adapted for this purpose. It is important, especially where space is charged for in freight, to reduce the bulk as far as possible. The brush is laid with butt ends outwards and the heads overlapping in the middle. Battens may be placed on top and bottom of the bales, and when pressed the whole is secured by five fairly stout wires. The size varies with individual growers; but a bale 46 inches by 30 inches by 24 inches, and weighing from 300 to 400 lb., can be recommended. Each bale should be legibly branded with an indication of the quality. There are several styles of home-made presses in use, but one that is coming largely into favour is made on similar lines to a wool-press, having wire ropes and a lever.

Yield.

The yield ranges from 10 to 15 cwt. of clean marketable brush, and 25 to 30 bushels of seed per acre. The price of broom millet fluctuates considerably with the season; and while it may vary from £18 to £40 per ton, the general average for prime hurl may be set down at £30, cover millet at £25 to £30, and inside millet at £20 per ton. Should the prices, however, be somewhat low when harvesting takes place, the millet may be stored for any length of time without deterioration, and disposed of when higher prices are obtainable.

On account of the seed not being properly developed, it is best to consume it on the farm. Its value may be estimated at 4s. per 4-bushel bag.

Selection of the Seed.

Special attention must be given to the selection of the seed. That obtained in the process of stripping should not be used for sowing. The practice of using such would speedily lead to deterioration and the production of inferior brush.

Good reliable seed can only be obtained by sowing in special areas and allowing the plants to mature their seed naturally. Individual plants may be allowed to ripen their seed in an ordinary field, but there is always a danger of them being hybridised by pollen from plants having inferior brush. In any case, seed should be obtained from those which produce the best heads. By proper cultivation and selection the quality and yield of any variety may be improved. Where seed-eating birds are troublesome, it may be necessary to cover the heads with some light material, such as muslin, when the seed is commencing to fill out. The ends must be tied loosely round the stalk so as not to interfere with

the free circulation of the sap. After harvesting, the heads are thoroughly dried, threshed, cleaned, and kept in a place secure from weevils and damp.

Where the conditions for saving seed are not suitable it is best to purchase from reliable seedsmen. There are several varieties on the market, but so far White Italian has given the best results in this State. At the same time, growers are advised to experiment with new varieties from time to time, or introduce fresh strains of those kinds they have in constant cultivation, with the view of finding out what particular kind is most suitable to their conditions.

By-products.

The object of the cultivator should be produce brush of the best quality; consequently all other use of the plant must give way to this. In former years millet was allowed to develop a fair proportion of seed, but the diminished value of the brush was not compensated for by the value of the seed obtained. The finest green brush is usually obtained while the seed is in an immature condition, but in the production of good golden-coloured millet a fair proportion of the grain is more or less developed. This contains an amount of nutriment, and can be utilised for the feeding of stock, thus assisting in reducing the expenses of the crop. It is, however, generally more or less soft and doughy, and, if intended to be kept for any great length of time, should be thoroughly dried by spreading out in thin layers on tarpaulins. Growers who insist upon ripening their seed will secure brush of an inferior quality, which brings a low price upon the market, and if exported injures the trade.

Stalks and Leaves.

The plant cannot be recommended as a particularly useful one for feeding purposes. While young a certain amount of sugar exists in the sap, but this soon disappears, and by the time the brush is cut the stalks are more or less dry or pithy, and contain a large proportion of fibre matter which is unpalatable. For this reason very little use is made of them beyond turning stock in after the harvest to feed upon the leaves. The refuse should afterwards be cut up with a heavy disc harrow, or cornstalk cutter, and ploughed under for manure.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Piggery Management.

By L. A. DOWNEY, H.D.A., Instructor in Pig Raising.

TO make a success of pig raising, it is essential to commence with good pigs, ample foods of the correct kinds, and good accommodation for the stock, but these factors alone are not sufficient to reasonably insure the success of the venture; it is further essential that the farmer should have a thorough knowledge of the care and management of his pigs in order that he may make the best use of his resources.

Handling the Boar and Sows Prior to Mating.

Young pigs should be well grown before mating; breeding from animals too early in their growth will, in a few generations, ruin their size, which is the most important characteristic of any pig. If the farmer wants to have large and fast-growing pigs, he must breed them that way as well as feed them that way. All the feed in the world won't make a draught horse of a pony colt, and the same applies to pigs—they must have size (which means fast and lean growth) bred into them. Usually pigs are well enough grown for mating at nine or ten months of age, or over 250 lb. live weight, and boars and sows must be kept apart until they reach that stage. If this is not done they will mate, perhaps, at five months of age.

Young boars and sows intended for breeding should be grazed in good paddocks and given ample flesh-forming foods, such as lucerne and separated milk, with a limited supply of grain, the object being to keep them in good thrifty growing condition and yet not too fat; if the breeding stock become too fat there is a risk of them not breeding satisfactorily. This is also the case where breeding pigs are kept in low condition. There is a medium condition which should be aimed at.

Mating.

For best results the boar should be kept in a separate enclosure to the sows, and when a sow is hogging (which is usually well indicated to the intelligent pig-raiser) she should be placed with the boar, and allowed one service, then removed, and if it is practicable, she should be put in a yard on her own so that she will not be knocked about by other pigs riding her. Then it may be advisable to allow the sow to return to the boar for a second service on the following day. If the sow does not hold to the service she will be in season again in twenty-one days. The period of heat (œstral period) usually lasts for two days, although it varies in different sows from one to three days.

After the service has taken place it should be recorded in a "breeding" book, together with the date, then three weeks later the sow should be watched to see if she returns to service. From this book entry the expected date of farrowing can be determined by reference to a gestation chart. The gestation period is approximately 112 days (easily remembered as approximately three months, three weeks, and three days). This period varies considerably and is usually less than 112 days with young sows and more than 112 days with old sows.

Care of In-pig Sows.

At service time, the sow is usually in medium condition. She should then be fed so as to have her gradually improving up to farrowing time, when she should be in her best form but not excessively fat. This condition can be obtained by good management and feeding without any forcing with fattening foods. Firstly, the sow should be given the run of a good grazing paddock where she will be able to forage for some of her food, and thus she may be kept at a low cost. The in-pig sow should be kept away from disturbances, such as dogs, horses, cattle, and other sows which are hogging, as rough treatment or excitement may cause a sow to abort. The feeding-trough should be arranged so that in-pig sows do not have to scramble and fight for their food. A lucerne paddock is an ideal place for dry sows; they also do well if allowed to roam over old cultivation paddocks or on root crops, such as artichokes and sweet potatoes, where they can harvest their food, thus getting the necessary exercise. Separated milk is a very valuable food for in-pig sows; they should also be given free access to clean drinking water. If maize is fed to in-pig sows, it should be given sparingly. The sows should have a warm, dry, shelter shed into which they can go for protection from the extremes of the weather. Shade trees are also very useful in the paddocks.

Plate 114.

The number and weight of the pigs reared in each litter reflect the efficiency of the business.

Towards the end of the gestation period it is very advisable to clean all the lice off the sow so that the young pigs will not be infested soon after they are born. To destroy the lice, the sow should receive three applications, one week apart, of either a weak coal-tar disinfectant solution, or some cheap grade of oil. These should be either sprayed or rubbed on to every part of the pig's skin.

Farrowing Time.

About a fortnight before the sow is expected to farrow she should be taken from the herd and placed in a run on her own where she can go into a clean and comfortable shed. Some short, dry grass or straw should be put into the shed for bedding, and this should be changed when necessary to keep the bed clean and dry. Exercise is essential at this period to prevent the sow from becoming constipated, which would cause trouble in parturition and may be followed by fever. Just prior to farrowing the sow should be fed very lightly, and the food should be of a laxative nature—green foods and a little molasses are very useful.

The sow should be kept as quiet as possible at farrowing time, although it is advisable to be with her if possible, not to interfere, but to be ready to give assistance if it is required. In attending a farrowing sow it is necessary to use a lot of common sense in conjunction with a knowledge of anatomy and physiology.

The Suckling Period.

It is important that the sow should not be fed for about twenty-four hours after farrowing, unless it is to give her a small drink. The first feed should be a light one, half-a-cupful of castor oil added to the first feed will help to put the sow in good form. For the first three weeks after farrowing the sow should be fed lightly, as overfeeding at this stage is a common cause of scours in the suckers. From the third week onwards the feed can be given freely, as at this stage the young pigs make most use of their food. When three weeks old the suckers should be provided with some food in a low trough; this in addition to the sow's milk, helps the young ones along and they are thus well grown at weaning time. A self-feeder may be used to advantage at this period.

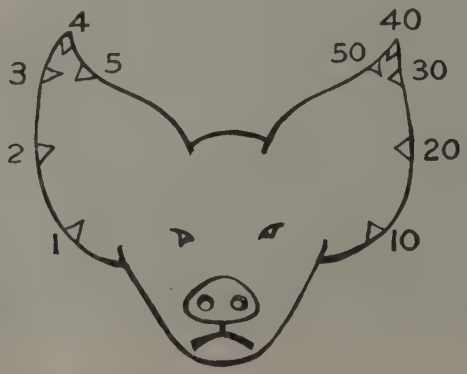

PLATE 115.—EAR-MARKING SYSTEM BY NUMBERS.

The male pigs not required for breeding should be castrated when six weeks old, as at this age the operation is easily performed and it has little ill effect on the pigs, which quickly recover if the operation is done properly and they are treated with some disinfectant, then put into a clean grass run. Ear tattooing and ear-marking can be done at the same time as castration.

GESTATION CHART FOR BREEDING SOWS.

Jan.	Date of Farrowing.	Feb.	Date of Farrowing.	March.	Date of Farrowing.	April.	Date of Farrowing.	May.	Date of Farrowing.	June.	Date of Farrowing.	July.	Date of Farrowing.	Aug.	Date of Farrowing.	Sept.	Date of Farrowing.	Oct.	Date of Farrowing.	Nov.	Date of Farrowing.	Dec.	Date of Farrowing.
1	22 April	1	23 May	1	20 June	1	21 July	1	20 Aug.	1	20 Sept.	1	20 Oct.	1	20 Nov.	1	21 Dec.	1	20 Jan.	1	20 Feb.	1	22 Mar.
2	23 ,,	2	24 ,,	2	21 ,,	2	22 ,,	2	21 ,,	2	21 ,,	2	21 ,,	2	21 ,,	2	22 ,,	2	21 ,,	2	21 ,,	2	23 ,,
3	24 ,,	3	25 ,,	3	22 ,,	3	23 ,,	3	22 ,,	3	22 ,,	3	22 ,,	3	22 ,,	3	23 ,,	3	22 ,,	3	22 ,,	3	24 ,,
4	25 ,,	4	26 ,,	4	23 ,,	4	24 ,,	4	23 ,,	4	23 ,,	4	23 ,,	4	23 ,,	4	24 ,,	4	23 ,,	4	23 ,,	4	25 ,,
5	26 ,,	5	27 ,,	5	24 ,,	5	25 ,,	5	24 ,,	5	24 ,,	5	24 ,,	5	24 ,,	5	25 ,,	5	24 ,,	5	24 ,,	5	26 ,,
6	27 ,,	6	28 ,,	6	25 ,,	6	26 ,,	6	25 ,,	6	25 ,,	6	25 ,,	6	25 ,,	6	26 ,,	6	25 ,,	6	25 ,,	6	27 ,,
7	28 ,,	7	29 ,,	7	26 ,,	7	27 ,,	7	26 ,,	7	26 ,,	7	26 ,,	7	26 ,,	7	27 ,,	7	26 ,,	7	26 ,,	7	28 ,,
8	29 ,,	8	30 ,,	8	27 ,,	8	28 ,,	8	27 ,,	8	27 ,,	8	27 ,,	8	27 ,,	8	28 ,,	8	27 ,,	8	27 ,,	8	29 ,,
9	30 ,,	9	31 ,,	9	28 ,,	9	29 ,,	9	28 ,,	9	28 ,,	9	28 ,,	9	28 ,,	9	29 ,,	9	28 ,,	9	28 ,,	9	30 ,,
10	1 May	10	1 June	10	29 ,,	10	30 ,,	10	29 ,,	10	29 ,,	10	29 ,,	10	29 ,,	10	30 ,,	10	29 ,,	10	1 Mar.	10	31 ,,
11	2 ,,	11	2 ,,	11	30 ,,	11	31 ,,	11	30 ,,	11	30 ,,	11	30 ,,	11	30 ,,	11	31 ,,	11	30 ,,	11	2 ,,	11	1 Apr.
12	3 ,,	12	3 ,,	12	1 July	12	1 Aug.	12	31 ,,	12	1 Oct.	12	31 ,,	12	1 Dec.	12	1 Jan.	12	31 ,,	12	3 ,,	12	2 ,,
13	4 ,,	13	4 ,,	13	2 ,,	13	2 ,,	13	1 Sept.	13	2 ,,	13	1 Nov.	13	2 ,,	13	2 ,,	13	1 Feb.	13	4 ,,	13	3 ,,
14	5 ,,	14	5 ,,	14	3 ,,	14	3 ,,	14	2 ,,	14	3 ,,	14	2 ,,	14	3 ,,	14	3 ,,	14	2 ,,	14	5 ,,	14	4 ,,
15	6 ,,	15	6 ,,	15	4 ,,	15	4 ,,	15	3 ,,	15	4 ,,	15	3 ,,	15	4 ,,	15	4 ,,	15	3 ,,	15	6 ,,	15	5 ,,
16	7 ,,	16	7 ,,	16	5 ,,	16	5 ,,	16	4 ,,	16	5 ,,	16	4 ,,	16	5 ,,	16	5 ,,	16	4 ,,	16	7 ,,	16	6 ,,
17	8 ,,	17	8 ,,	17	6 ,,	17	6 ,,	17	5 ,,	17	6 ,,	17	5 ,,	17	6 ,,	17	6 ,,	17	5 ,,	17	8 ,,	17	7 ,,
18	9 ,,	18	9 ,,	18	7 ,,	18	7 ,,	18	6 ,,	18	7 ,,	18	6 ,,	18	7 ,,	18	7 ,,	18	6 ,,	18	9 ,,	18	8 ,,
19	10 ,,	19	10 ,,	19	8 ,,	19	8 ,,	19	7 ,,	19	8 ,,	19	7 ,,	19	8 ,,	19	8 ,,	19	7 ,,	19	10 ,,	19	9 ,,
20	11 ,,	20	11 ,,	20	9 ,,	20	9 ,,	20	8 ,,	20	9 ,,	20	8 ,,	20	9 ,,	20	9 ,,	20	8 ,,	20	11 ,,	20	10 ,,
21	12 ,,	21	12 ,,	21	10 ,,	21	10 ,,	21	9 ,,	21	10 ,,	21	9 ,,	21	10 ,,	21	10 ,,	21	9 ,,	21	12 ,,	21	11 ,,
22	13 ,,	22	13 ,,	22	11 ,,	22	11 ,,	22	10 ,,	22	11 ,,	22	10 ,,	22	11 ,,	22	11 ,,	22	10 ,,	22	13 ,,	22	12 ,,
23	14 ,,	23	14 ,,	23	12 ,,	23	12 ,,	23	11 ,,	23	12 ,,	23	11 ,,	23	12 ,,	23	12 ,,	23	11 ,,	23	14 ,,	23	13 ,,
24	15 ,,	24	15 ,,	24	13 ,,	24	13 ,,	24	12 ,,	24	13 ,,	24	12 ,,	24	13 ,,	24	13 ,,	24	12 ,,	24	15 ,,	24	14 ,,
25	16 ,,	25	16 ,,	25	14 ,,	25	14 ,,	25	13 ,,	25	14 ,,	25	13 ,,	25	14 ,,	25	14 ,,	25	13 ,,	25	16 ,,	25	15 ,,
26	17 ,,	26	17 ,,	26	15 ,,	26	15 ,,	26	14 ,,	26	15 ,,	26	14 ,,	26	15 ,,	26	15 ,,	26	14 ,,	26	17 ,,	26	16 ,,
27	18 ,,	27	18 ,,	27	16 ,,	27	16 ,,	27	15 ,,	27	16 ,,	27	15 ,,	27	16 ,,	27	16 ,,	27	15 ,,	27	18 ,,	27	17 ,,
28	19 ,,	28	19 ,,	28	17 ,,	28	17 ,,	28	16 ,,	28	17 ,,	28	16 ,,	28	17 ,,	28	17 ,,	28	16 ,,	28	19 ,,	28	18 ,,
29	20 ,,	—	—	29	18 ,,	29	18 ,,	29	17 ,,	29	18 ,,	29	17 ,,	29	18 ,,	29	18 ,,	29	17 ,,	29	20 ,,	29	19 ,,
30	21 ,,	—	—	30	19 ,,	30	19 ,,	30	18 ,,	30	19 ,,	30	18 ,,	30	19 ,,	30	19 ,,	30	18 ,,	30	21 ,,	30	20 ,,
31	22 ,,	—	—	31	20 ,,	—	—	31	19 ,,	—	—	31	19 ,,	31	20 ,,	—	—	31	19 ,,	—	—	31	21 ,,

NOTE.—Heavy figures in above table indicate date of service.

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days.

SOW'S BREEDING RECORD.

Breed: Name: Registered Number: Date of Birth: Earmark:

Date of Service.	Date of Farrowing.	Sire of Litter.	Number Born.		Number Weaned.		Tattoo or Earmark Given and Date Weaned.	Died after Weaning.		Sold or Killed for Meat.		Stud Sales.		Gross Returns.	Remarks.
			Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.	Male.	Female.		

COPY OF PAGE FROM A RECORD BOOK.

Weaning.

The pigs should be weaned from the sow when they are eight to nine weeks old. After being separated for a day, the sow should be put with the litter for an hour or so for the pigs to empty her udders. This should be repeated on the following day, by which time most sows will be dry, although, in some cases, it is necessary to put the sow back to the suckers for several days before she dries off. At this time the sow's feed should be very light, so that she will not make much milk. The sow will usually come on hogging when the litter is about nine weeks old, and if she is not too low in condition, she can be mated to the boar then, but in cases where the sow's condition is very low, it is preferable to withhold the service for at least three weeks.

Record of Performance.

Just as poultry breeders record egg-laying as a measure of production of their birds, and dairy farmers test and record the production of their cows to ascertain which are the best producers, so must pig-raisers record the production of their breeding stock so that they may have a record of performance on which to select or cull their breeding stock. The system of selection by appearance alone is not sufficient. Pig recording is practised by individual breeders and in some countries by organisations and, although most systems of recording vary a little, the common factor throughout appears to be the weighing of litters of pigs at eight weeks old, the number of pigs, and individual and total weights being taken as indications of the productivity of the sow and boar, and of the efficiency of the feeding and management of the stock.

Work done in pig recording shows that a standard which breeders should aim at is an average of eight pigs reared per litter, and an average weight of 40 lb. per pig at eight weeks old.

The Growing Period.

It should be the object of the pig-raiser after weaning his pigs to have them growing rapidly until they are ready to market; there should be no "store" period, but the pigs should be fed in such a way as to have them "finished," but not excessively fat, when they reach their weight range as porkers, light baconers, or heavy baconers, as the case may be.

WHEN GOD PLANTED A GARDEN.

In the beginning . . . the Lord God planted a garden eastward in Eden; and out of the ground made the Lord God to grow every tree that is pleasant to the sight and good for food; and a river went out of Eden to water the garden; and the Lord God took the man and put him into the garden of Eden to dress it and keep it.—Genesis.

Bloat in Cattle.

THE present season with the conditions favourable to the production of an abundance of succulent green foods has given rise to a number of cases of *hoven* or *bloat* in cattle. Stockowners know that bloat is liable to affect animals that are suddenly turned into lucerne, clover, and field crops, especially when the crop is immature and wet with dew or rain. They know also that hungry cattle are more susceptible to bloat.

The condition is caused by the formation of large quantities of gas in the *rumen* or *paunch,* which results in an abnormal distension or swelling of the left flank. It is known that the food distending the paunch or rumen becomes yeasty so that it froths and foams and throws off large quantities of gas. The natural or normal way of expulsion of gas by the animal is by belching, but when the gas forms quickly and in large quantities and the stomach becomes unduly distended normal belching appears to be checked and does not occur. It has been said that the distension may cause a partial paralysis of the muscle fibres of the walls of the stomach, which prevents the normal churning motion of the stomach (Peristalsis), so essential in the preparation of the roughage for the full digestion in the fourth department of the stomach, the abomasun.

Peristalsis aids in the belching or expulsion of gases from the stomach, and when the action is checked bloating would occur. It has been suggested by nutritional chemists that the sugar content of lucerne and clover blossoms is a factor in increasing fermentation and formation of gases in the paunch, but of course this theory would not hold where the animals have eaten immature lucerne or clover which have been known to cause bloating. It may be possible that the *cyanoglucoside content* is a contributing factor apart from the flowers or blossoms.

Treatment of Bloat.

A number of remedies have been tried, and have proved more or less successful. The use of a gag to keep the mouth open, until the animal has belched the gas out by the mouth, is useful in mild attacks. Other remedies, including the internal administration of an ounce of bicarbonate of soda and an ounce of ginger, which may be repeated every two or three hours until the animal is relieved. A quart of treacle in a gallon of water has afforded relief in some cases. Two ounces of turpentine in milk has afforded relief, but in such cases it must be noted that the attack is not severe. In all cases of bloat the most effective treatment is the puncturing of the paunch.

The puncture is made in the left side of the paunch at a point equidistant from the last rib, the edge of the *loin bones,* and the angle of the *haunch*. The proper instrument to use is a trocar and canula, the canula being a tube or covering through which the trocar, a sharp-pointer instrument passes.

The instrument is thrust into the *rumen* and the trocar is then withdrawn, leaving the canula in place for the gas to escape through it. In cases of emergency when no instrument is available a knife may be

used, the gas escaping through the opening. But the use of a knife is not advocated as it may give rise to complications and cause the death of the animal if it is not carried out by a person who is experienced in it.

After the gas has escaped, the animal may be given a dose of linseed oil, 1½ pints, turpentine a tablespoonful, mixed thoroughly by shaking while being given to the animal.

QUEENSLAND SHOW DATES, 1934.

April.

Pittsworth, 4th and 5th
Warwick, 10th to 12th
Toowoomba, 16th to 19th
Rosewood Camp Draft, 7th
Goondidwindi, 27th and 28th
Oakey, 28th
Taroom Camp Draft, 30th

May.

Taroom, 1st and 2nd (Camp Draft, 5th)
Dalby, 3rd and 4th
Beaudesert, 2nd and 3rd
Nanango, 3rd and 4th
Blackall, 7th to 9th
Chinchilla, 8th and 9th
Charleville, 8th to 10th
Crow's Nest, 9th and 10th
Boonah, 9th and 10th
Monto, 9th and 10th
Kingaroy, 10th and 11th
Ipswich, 15th to 18th
Miles, 16th
Kilkivan, 16th and 17th
Mitchell, 16th and 17th
Mundubbera, 16th and 17th
Dirranbandi, 16th and 17th
Wondai, 17th and 18th
Roma, 22nd to 24th
Gympie, 23rd and 24th
Emerald, 23rd and 24th
Biggenden, 24th and 25th
Murgon, 24th to 26th
Toogoolawah, 25th and 26th
Kalbar, 26th
Goomeri, 29th and 30th

June.

Maryborough, 1st, 2nd, and 4th
Marburg, 1st and 2nd
Childers, 5th and 6th
Gin Gin, 5th and 6th

June—*continued.*

Bundaberg, 7th to 9th
Lowood, 8th and 9th
Bororen and Miriam Vale, 11th and 12th
Wowan, 14th and 15th
Rockhampton, 19th to 23rd
Mackay, 26th to 28th
Laidley, 27th and 28th
Proserpine, 29th and 30th
Townsville Rodeo, 30th

July.

Bowen, 4th and 5th
Gatton, 4th and 5th
Kilcoy, 5th and 6th
Ayr, 6th and 7th
Townsville, 10th to 12th
Woodford, 12th and 13th
Rosewood, 13th and 14th
Cleveland, 13th and 14th
Cairns, 17th to 19th
Charters Towers, 18th and 19th
Caboolture, 20th
Nambour, 18th and 19th
Atherton, 24th and 25th
Pine Rivers, 27th and 28th

August.

Royal National, 6th to 11th
Home Hill, 31st August and 1st September

September.

Enoggera, 1st
Imbil, 7th and 8th
Ingham, 7th and 8th
Innisfail, 14th and 15th
Beenleigh, 20th and 21st
Mareeba, 20th and 21st
Rocklea, 22nd
Malanda, 26th and 27th
Kenilworth, 29th

October.

Millaa Millaa, 5th and 6th
Tully, 12th and 13th

Seasonal Farm Crops.

By A. E. GIBSON, Director of Agriculture.*

AT this period of the year, the dairy farmer and those primary producers who derive at least a portion of their income from the keeping of stock, should be giving consideration to the planting or sowing of those crops which during our recognised season of lessened rainfall will still enable them to maintain supplies to the local butter or cheese factory or top-off stock which are destined for the meat market, and it is with the idea of presenting for their consideration suitable crops for such purpose that the present lecturette has been prepared.

Land Preparation.

As with all crops, careful initial preparation is necessary and, although during periods of frequent rainfall crops of a satisfactory type can be successfully raised, it is to the careful farmer that success is ensured during those periods when the rainfall is below normal.

Having carefully prepared the land, consideration is naturally given to the type of crop which it is desired to produce and its suitability to the class of soil, and last but not least the temperate conditions required in connection with its production.

Winter Cereals and Legumes.

The dairyman with a view to continuity of green fodder supplies will naturally incline towards winter cereals; those who include the raising of pigs with their dairying activities will also give consideration to root and other crops that will maintain their growing pigs during the winter months, when skim milk supplies are usually somewhat restricted.

Barley, and preferably an awnless type, although not the earliest of the winter cereals, is one to which most attention is given. It is suited to many types of soil, but will not thrive in sour or acid soils. Severe frosts will check its growth, whilst excessive wet shows its effects in the yellowing of the leaves. It provides succulent grazing for calves, lambs, and pigs, and will stand fairly hard grazing. Where it is intended to plant for fodder purposes with a view of feeding to stock, rather than grazing off, the addition of field peas is recommended, and if sown in conjunction with skinless barley, excellent results are attained.

Field peas of the Dun, Grey, or Partridge varieties are usually available from Brisbane or Toowoomba seed merchants, the former variety perhaps being the most popular.

When used in conjunction with barley, best results are obtained by sowing at the rate of ¼ bushel to ½ bushel of peas to ¾ bushel to 1 bushel of barley, and if sown under favourable conditions of soil and moisture such will give a sufficient density of growth.

Sow now or as early as possible in the present month, and if you are possessed of a grain drill drill in at a depth of not less than 2 inches, stopping one-third of the grain runs, to aid in distributing the small quantity of seed, otherwise broadcast over and in the direction of the furrows, and follow up with one stroke of the harrows in the same direction.

* In a broadcast address from Radio Station 4QG.

The barley may then be drilled or broadcasted and followed by two harrowings, the last at right angles to the direction of the previous harrowing.

For a rotational crop, follow with a crop of oats and peas, sown in a similar manner to that recommended for barley and peas. Of all the varieties of oats grown for hay or fodder purposes, perhaps the most popular is Algerian, but of later years selections have been made which have given a somewhat wider range of better types, although many have been the result of crossing with the Algerian variety.

Perhaps for Queensland purposes Sunrise is to be preferred to Algerian and is much less liable to rust. It is an early-maturing type carrying a medium coarse straw and consequently for hay purposes should be sown slightly thicker than is usual with Algerians. It stands feeding off well.

Mulga is also a satisfactory variety for this State and is in fact a selection from Sunrise, but somewhat earlier in maturing than that variety and does well in warm districts. It is a variety of oat that can be sown for successional grazing off and lends itself admirably for fodder purposes when sown in conjunction with field peas. Sow at the rate of 1¼ bushels per acre, using the same quantity of peas as in the case of barley.

Fodder Crops for Pigs.

Where the dairyman, as he should, combines pig-raising with his dairying activities, the advantage of such crops as rape, swede turnips and field carrots, mangolds and sugar beet, should claim his attention, and under normal conditions in the cooler portions of this State give very satisfactory returns.

Rape may be sown now in drills 14 inches apart using 3 to 4 lb. of seed per acre. Dwarf Essex is the best variety for Queensland purposes, but should be cleaned up before the warm weather sets in as it is usually affected by cabbage aphis. Rape, when ploughed in, has considerable value as a soil renovator. Care requires to be taken in feeding off rape, as it is liable to cause bloat or hoven.

Swede turnips can be sown either broadcast or in drills, but the latter is preferable unless in those areas where winter rainfall is more favourable. Two to 3 lb. in drills 2 feet to 2 feet 6 inches apart will be found to be ample, but double that quantity if broadcasted. The latter system is preferable, perhaps, where it is intended to graze off the crop and climatic conditions lend themselves to such practices. Varieties recommended are Purple Top and Monarch.

Field carrots have given satisfactory results in quite a number of localities in Southern Queensland and are excellent where root crops can be utilised. Sow at the rate of 4 lb. per acre in drills spaced 2 feet 6 inches apart. White Belgian is a variety recommended.

Although in the cooler districts mangolds and sugar beet should now be above ground, in the warmer areas present month sowings will give quite satisfactory yields during the late winter and early spring months.

Mangolds and beet require to be sown in clean, well-prepared land, in drills 2 feet 6 inches apart, and when well above the surface should be thinned out with the hoe to give the roots a chance to develop. Weeds at the same time should be attended to.

Mangolds and beet are not remarkable for their germinating qualities, consequently sowings are comparatively heavy. Sow mangold seed at the rate of 5 lb. per acre. Sugar beet, however, require from 7 to 8 lb. per acre.

Long Yellow, Long Red, and Golden Tankard are amongst the best of the varieties of mangolds, whilst Vilmorin's Improved and Wanzelben are representative varieties of sugar beet.

Lucerne.

Perhaps the most valuable fodder crop to which serious consideration should be given for sowing during the months of April and May is that king of all fodders—lucerne—and as this crop will give satisfactory returns over a period of years every care should be given to the early and thorough preparation of the soil. Lucerne prefers a deep, rich, calcareous soil, and gives excellent results on the basaltic soils met with on the Darling Downs, and the Lockyer and Fassifern districts, but very good results are obtainable along alluvial creek flats, being useful where nut grass is in evidence, and for such reason it is not desirable that general cultivation be continued. A sandy loam, however, does not give satisfactory growths of lucerne, although where such is present it can be utilised when well fertilized, preferably with heavy dressings of farmyard manure, for green feed for poultry. Above all, badly drained soils are fatal to the growth of lucerne.

On new land a preparatory winter or spring crop is advisable, and when this has been harvested the stubbles should be ploughed under and the soil allowed to mellow. Any volunteer growths that appear should be subsequently ploughed under in the second ploughing, carried out at right angles to the first ploughing. The soil may be left in its rough condition and will thus absorb all rainfall that is experienced whilst lying fallow, the result being a breaking down of clods, and if given a stroke of the harrows a moderate tilth will result. At this stage weed growth should be very decidedly checked, and after each shower the ground harrowed and left loose on the surface.

If this is not given effect to, the surface becomes compacted and the greater proportion of moisture, instead of being absorbed by the soil, becomes diverted over the surface to lower levels.

At least three ploughings should be given prior to sowing, each being carried out at a greater depth to the one preceding. Surface tillage should be given effect to with the object of reducing the soil surface to that fineness of texture necessary in the preparation of an onion bed.

Of the many varieties of lucerne which have been experimented with in this State none appear to be superior or even equal to that variety which we term Broad Leaf Hunter River and, although many growers insist on none but that which is actually produced in the Hunter River district of New South Wales, I have to remind them that New South Wales is a good customer of Queensland for lucerne seed, and at the same time much is reimported. Under these conditions, provided that the seed is cleaned and is free from dodder, it would appear unnecessary to incur the cost of two railway freights when obtaining the same article.

When purchasing lucerne seed, from whatever source, it is wiser to obtain a sample from the vendor, and if in doubt of its germinating qualities such can be ascertained by submitting the sample to the Pure

Seeds Branch of the Department of Agriculture and Stock, and if such is required, a certificate not only of its percentage of germination, but of its purity can be obtained. Sow at the rate of 10 lb. per acre and, whilst on the subject of quantity of seed per acre, it should be noted that where a high percentage of germination is in evidence, the quantity of seed per acre can be lessened even down to 7 or 8 lb. without materially lessening the density of the subsequent "stand." A frequent cause of bad germination in the field is sowing at an excessive depth, half an inch being ample provided that conditions for sowing are as they should be.

I once inspected in the Boonah district an area sown just prior to rain that only received 7 lb. per acre, when rain fell and prevented the owner from carrying out his original intention of sowing a further 7 lb. at right angles to the direction of the first sowing. Before he could complete the operation, the young plants were in evidence. The stand of lucerne so obtained was dense enough for practical purposes and I understand gave satisfactory cuttings for several years.

WHEATGROWING ON THE DAWSON.

Speaking on the wheatgrowing possibilities on the Dawson River country on his return from a recent visit to that region, Mr. T. L. Williams, M.L.A. (Port Curtis), said:—

One thing that struck me somewhat forcibly during this visit was the fact that many of the settlers in the lower end of the Dawson Valley and the western portions of the Callide Valley lands in particular could very profitably engage in wheatgrowing on the larger outside areas. Several settlers in fact, have carried out "trial" experiments in this direction, with considerable and heartening success.

Among the number are Messrs. C. and F. Letchford, two comparatively new settlers a few miles out from the Theodore township in the dry, or non-irrigable section, who last year planted approximately 250 acres with wheat, from which the return was in the vicinity of 1,200 bags. The land received no special treatment or preparation, and was not even fallowed, being prepared late and planted to suit weather conditions pervailing at the time.

When dealing with this matter some years ago, on the occasion of a previous visit, I remarked at some length on the possibility of wheatgrowing in the Dawson and Callide Valley Areas, and said at the time that there was an undoubted future for wheatgrowing in the Theodore Settlement Area (more particularly in the adjacent holdings, which ultimately may form a part of the area to come under future direct settlement). There are, in fact, many thousands of acres of land suitable in every way for its cultivation and production in portions of the Woolthorpe, Colombo, Walloon, and Kianga holdings, as well as in the vicinity of Moura, adjacent to the railway line to Theodore. Settlers who happen to have come from wheatgrowing areas in the South, as well as in Queensland, readily agree on this point, whilst not a few visitors to the settlement in recent years express a somewhat similar viewpoint.

Cotton and small-crop growing, together with dairying, will no doubt be the main objectives of the majority of the settlers for the first few years of the settlement 's existence, but sooner or later large areas will be eagerly sought after and snapped up for wheatgrowing purposes, which, without a doubt, will result in the Theodore Settlement Area becoming one of the most successful in the history of irrigation projects in the Commonwealth.

I have no cause to change my viewpoint to-day in this connection, particularly after seeing what has been achieved by the Messrs. Letchford Brothers and a number of other wheatgrowing enthusiasts in both areas, and hearing further favourable expressions in this regard from other settlers.

Even sheep farming and the growing of fat lambs for market purposes could also become a profitable sideline in many instances, where conditions happened to be suitable and the required areas obtainable for the purpose. For both needs, however, a suitable crossbreed would be necessary if any degree of success were to be obtained, and in this respect I would not hesitate to recommend heavy-coated merino ewes and English Leicester rams. Dingoes would no doubt be a source of much annoyance and loss, of course, and the necessary precautions to combat the pest would have to be taken to ensure success.

Agricultural Notes.

By H. S. HUNTER, Agricultural Branch.

Seasonal Prospects.

AS a result of favourable seasonal conditions, the output of pastoral and agricultural products is being well maintained; prospects for the immediate future are encouraging from a production point of view, and the preparation of land for winter-growing crops can be carried out under suitable conditions. The chief disabilities confronting the primary producer continue to be those associated with marketing, in which field of activity problems have arisen which are claiming the attention of Governments in all countries.

Throughout the first four or five years of financial depression Queensland, as a whole, fortunately, has experienced reasonably good seasons. Although there have been short periods of dry weather, and more or less severe localised droughts in some districts, the State as a whole has not encountered, in the period referred to, any general drought such as has been experienced at recurring intervals in the past and, as a consequence, a high average of production has compensated in some degree for low market values.

The producer also has benefited from the operations of Marketing Boards operating under the State's marketing legislation. For products organised in this way, the producer invariably has secured a better price for his goods than his brother farmer in other States has been able to obtain. There are fifteen products, including sugar, which are subject to organised marketing in Queensland, the value of which is approximately £17,000,000 annually.

Wool.

Fortunately our principal revenue-producing industry, wool production, has risen from the rut. Prices have been well maintained at recent sales, ranging up to 23½d. for greasy and 41d. for scoured wool. An indication of the value to Australia of the improvement in wool prices is provided in the figures recently made available by the Commonwealth Department of Commerce, which show that the value of wool exported from Australia during the first seven months of the present financial year was £17,600,000 more than for the corresponding period of last year.

Wheat.

The wheat-growing industry is in a totally different position. Hitherto Australia, since the depression, has been enabled to clear all of her stocks, although at low values, mainly due to sales in the Eastern market, whereas most of the other wheat-exporting countries have been accumulating vast carry-over stocks. However, the quantity of wheat and flour shipped overseas from last season's crop, is equivalent to 26,000,000 bushels only, as compared with 52,000,000 bushels for a corresponding period in the preceding season. This falling off in exports has been attributed to large sales of wheat to China on long credit from the United States of America, and to heavy shipments of wheat to the East from the Argentine. Although Queensland is not a wheat-exporting State, local prices are influenced indirectly by export values.

Sugar.

The northern areas of the State experienced excessive rains during March; flood damage was occasioned in certain districts, while heavy winds resulted in lodging and damage to crops. As yet, the true extent of the loss is not ascertainable, and it is anticipated that the losses due to grubs will be much in excess of those of last year.

The areas south of Townsville have been favoured generally by conditions which make for continued growth, and the present indications are that the crop in these parts will exceed that of 1933.

Dairying.

Butter and cheese factories are maintaining a high output, but returns to producers are so low that hardship is caused in many cases. It is probable that within the course of a few weeks the new Australian stabilisation scheme will be put into operation. Agreements have been forwarded to the various factories for signing as a preliminary to the inauguration of the scheme, which is similar to the existing Queensland stabilisation scheme in that all factories will be required to bear their fair share of the less remunerative export market.

The advantage of the Australian-wide scheme is that, when it is in operation local prices for butter will not be influenced by fluctuations in butter prices on the London market.

The previous record for butter production in Queensland already has been eclipsed, and with a continuance of favourable conditions it is expected that the total production for the season will be in the vicinity of 2,000,000 boxes.

Maize.

Harvesting of the main maize crop now has commenced, the markets have been well supplied with new season's grain and prices have shown a further decline. For the first three weeks of March the maximum daily quotations averaged 2s. 4½d. per bushel. Excellent crops are reported in the Kingaroy district. In fact, all maize-growing areas of Southern Queensland will have unusually heavy crops, including the Darling Downs. It has been estimated that the Atherton Tableland crop will yield about 8,000 tons of grain.

Cotton.

Queensland's record crop of cotton is now being harvested, and the ginneries are working to full capacity. It has been found necessary to reopen the Gladstone ginnery—after it had been closed for a period of nine years—in order to deal with part of the crop. Arrangements have been made whereby it will be possible for about half of the crop to be absorbed by Australian spinners. Considerable interest is being evinced in the visit of the Minister for Customs who, at the time of writing, is visiting the cotton-growing areas.

Peanuts.

It is probable that the peanut yield also will constitute a record. About 9,000 acres have been planted to the crop, and seasonal conditions have favoured its development. The peanut is a crop of potential value as a rotational crop for tobacco lands and is now being experimented with for this purpose. About 200 acres have been planted with peanuts this season in the Mareeba tobacco district.

Since the removal of the embargo on foreign peanuts, the Tariff Board has conducted an inquiry into the industry, following on a request for an increase in Customs duty.

Tobacco.

Blue mould disease has been exceptionally prevalent in all tobacco-growing areas this season, and as a result growers have experienced great difficulty in raising seedlings in time for transplanting. In many instances transplanting was still progressing during the month, which is somewhat late for good results.

A considerable reduction in the area under tobacco is anticipated this season, owing to both disease and to the fact that a number of growers went out of the industry or planted smaller areas for various other reasons.

Although it is yet too early to make a reliable forecast of the probable acreage, it would appear from information received that the total area may not exceed 3,000 acres, as compared with approximately 8,000 acres last season.

NATURAL GRASSES AND THEIR REGENERATION.

Problems confronting the people who depend on Mitchell and Flinders grasses for the sustenance of their flocks and herds are to be investigated by the Department of Agriculture and Stock. The assistant botanist of the department (Mr. W. D. Francis) is about to leave on a special mission of inquiry in the Charleville district.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) announced recently that his department had given much attention to the regeneration of Mitchell grasses. Some inquiry also had been made in respect of Flinders grasses. The researches of Dr. E. Hirschfeld had been of great value, but reports were continually reaching the department to indicate conclusively the need for a wider range of inquiry in relation to both types of grasses.

Mitchell grass, added the Minister, was the standard natural grass of the best of the State's sheep areas, but complaints had been received recently that the Mitchell grass land was not regenerating from the continued drought in the way that it had in past years. Consequently, it had been decided to embark on a vigorous inquiry into this and allied problems. Mr. W. D. Francis would leave within a few days for Charleville to obtain information from station owners and others as to the regrowth made this season, following several years of drought. Local stock inspectors would co-operate with Mr. Francis.

In addition, a questionnaire had been distributed to all officers of the department and station managers within the Flinders and Mitchell grass areas. This sought information on the responsiveness of the grasses during the present season, and also asked for specimens, and any notes or information on different kinds of Flinders or Mitchell grass; also for details of any other grasses of outstanding value, particularly in relation to palatability and drought resistance; and concerning any herbs of outstanding merit associated with the grasses.

Mr. Bulcock said it was hoped by this means to collate valuable information, upon which would depend the nature of a survey to be embarked upon at a later date. He appealed to pastoralists to supply the required information. As evidence of the interest now being taken in the preservation of natural pastures, added Mr. Bulcock, one of the big Australian pastoral institutions was circularising the Australian Universities to obtain the services of a graduate to study inland pastures.

PLATE 116.
Thrashing Oats on Mr. C. F. Adermann's Farm, Kingaroy.
Photo. by courtesy of the "Courier-Mail."]

PLATE 117.
A field of peanuts on Mr. L. V. Young's farm, Wooroolin.

By courtesy of the "Courier-Mail."]

Plywood and Veneer Industry.

FORMATION OF MARKETING BOARD.

THE Minister for Agriculture (Hon. F. W. Bulcock) announced recently that the Government had decided on the formation of a marketing board to control the Queensland plywood and veneer industry. This decision, said Mr. Bulcock, followed an application made by the Plywood Manufacturers' Association of this State, which had been supported by deputations and representations from all South Queensland factories, with one exception.

The plywood industry is an important one for Queensland as it is in this State that most of the Australian production of plywood and veneers from native timbers is manufactured.

The capital invested in the industry in Queensland is in the neighbourhood of £350,000. Last year it used 8,000,000 super. feet of hoop pine logs of a value of £90,000 delivered at factories, and gave employment to over 400 hands, with a total pay-roll of £1,600 per week when all mills are working, in addition to the work afforded in cutting, hauling, loading, railage, cartage, and shipping. The production of plywood by South Queensland factories during last year was approximately 32,000,000 square feet of a value of over £200,000.

Possibility of Increased Employment.

Whilst these figures speak for themselves, the Minister said that even on the present capital invested a considerably increased production is possible. Many plants are capable of a much greater annual output, if markets are available, and it is estimated that the existing factories could increase their production to 50,000,000 square feet per annum. Were such an objective realised the increased employment afforded would be obvious.

The industry has represented to the Government that what principally hampers the attainment of this objective is the fact that, through fierce competition among themselves, it has not been possible to exploit new markets and new uses to the fullest extent. Failing to secure absolute unanimity the manufacturers approached the Government for the formation of a pool under the Primary Producers' Organisation and Marketing Acts.

Other Advantages.

The Government has made a careful inquiry into the application and has found that organisation of the industry could, in addition to affording the opportunity of increased employment, have other advantages in that orderly marketing of the product for both Australian and overseas markets could be assured; the undue competition which has been detrimental to the industry and the State could be eliminated; the prices could be fixed in such a way as to protect the interests of both consumer and manufacturer and of the Government as the owner of the principal supplies of raw material, and bring about stability and continuous employment in the industry; the use of new woods and methods could be investigated thus more firmly establishing the life of the industry; standards and gradings of veneers and plywood

could be fixed with a view to improvement; and last, but not least, considerable work could be done in securing new markets for Queensland plywood.

"Having regard to all these facts," said Mr. Bulcock, "it appeared to the Government that it is imperative that some steps should be taken to lift the industry from its present disorganised condition, which is not in the best interests of the State generally, and after due consideration the formation of a Plywood and Veneers Marketing Board has been approved."

Public Interests Protected.

To protect the interests of the public, it is proposed to include on the board representatives of the Department of Agriculture and of the Forestry Sub-department. The proposed board, when constituted, will apply to South Queensland only; its functions not extending beyond the 23rd parallel.

"It is worthy of note," concluded the Minister, "that this is the first time in Australia that a marketing board has been appointed to control plywood and veneers, and is significant of the progressiveness of the policy of this Government in assisting in the orderly and stabilised manufacture and marketing of Queensland's raw materials—a policy in keeping with modern trend in administration the world over."

WHEAT AS STOCK FOOD.

The relatively large quantity of the current season's crop which is weather damaged, coupled with the low price ruling for even the best wheat, opens up a question whether more grain cannot be used as stock feed.

An average sample of wheat possesses the same protein content as oats, and rather more than maize. It is richer in carbohydrates than either oats or maize, but is relatively deficient in fats. This deficiency of oil or fat renders the grain less palatable to stock and less readily mixed with the saliva, whereby the digestibility of the grain is to some extent adversely affected. In a non-ruminating animal such as a horse, where the stomach is simple and of relatively small capacity, the proper mastication and mixing of food with saliva before swallowing is of importance if the digestion is to be saved. Ruminants, on the other hand, are in a better position to deal satisfactorily with the grain on account of the preparation which it undergoes in the process of chewing the cud before entering the fourth or true stomach.

Wheat may, nevertheless, be fed to horses with advantage and safety if discretion is exercised in its use, and it is first ground or rolled. It should be fed in moderate quantities, up to 7 or 8 lb. per day, and mixed with some bulky material such as bran or chaff. When it is desired to change horses over from oats to wheat, the change should be made gradually in order to allow the animal's digestive organs to become accustomed to the new diet.

Experiments conducted in various countries show that wheat can be fed to dairy cows with profit when mixed with other foods. A good meal mixture can be prepared as follows:—4 parts ground wheat, 1 part bran, 1 part linseed meal.

As portion of the ration for fattening cattle, wheat has given better results than oats.

Sheep will do well on wheat, which is better fed whole. In America it is considered slightly superior to maize, but experience in Australia shows that maize gives a somewhat better result. That, however, may be accounted for by the fact that grain is usually fed to sheep from the ground, and not from troughing. Wheat being so much smaller than maize, a certain amount of earth is picked up with it when feeding, to the detriment of the diet.

At least one Riverina farmer has proved it good business to feed wheat to pigs rather than accept anything below 3s. a bushel for the grain. His practice is to crush the wheat and feed it to the pigs through a self-regulating hopper erected in the yard. The pigs have access to plenty of water and fatten rapidly.—"The Pastoral Review."

The Conquest of Climate.

By R. W. CILENTO, M.D., B.S. (Adelaide), D.T.M. and H. (England), Senior Medical Officer, Commonwealth Department of Health, Canberra, F.T.

Subjoined are extracts from the Anne Mackenzie Oration delivered by Dr. Cilento at the Institute of Anatomy, Canberra, on 1st March, 1933. In view of the national importance of extending settlement within our tropical territory, Dr. Cilento's oration, a valuable contribution to current thought on the subject, is of great interest to not only Queensland residents north of Capricorn, but also to everyone concerned with the future of our race and the preservation of the White Australia ideal.—Ed.

MAN'S real ability to bear any extreme of temperature, altitude, rainfall *et cetera*, though often denied, is demonstrated by everyday experience. Lucien Lefèbvre, in the delightful work to which I am indebted for many of my examples, in developing the theme that man deliberately sets Nature at defiance, says:

Can we talk of heat and cold—sheer heat and sheer cold, so to speak? Geographies generally agree to place the "pole of cold" at Verkhoyansk in Siberia; and it is a fact that of the three poles of cold which Mohn recognises in the Northern hemisphere, in his account of the meteorological results of Nansen's Polar Expedition (Eastern Siberia, Central Greenland, and the Polar Region properly so called), Siberia is the chief and the most accentuated. But Verkhoyansk, which is included in it, is an inhabited place, with a population of 356, according to the latest census, and the soil there is sown and cultivated every year: indeed, human families live and multiply there under conditions which are elsewhere considered prohibitive, for the January mean is −51.2 degrees. Inversely, Massowah on the Red Sea, in the middle of a stifling coastal plain, combines all the extreme conditions of heat which our meteorological treatises define, and is, notwithstanding, regularly inhabited (population 7,000) . . . Another series of meteorological phenomena has to be considered: the restrictive action of the barometric pressure is well known and evident. Men can work but little, and that with difficulty, under too low a pressure, but this did not prevent the making of a railway in Peru at a height of 13,000 ft.; nor the working of sulphur mines on Popacatepetl, at 17,800 ft. A road has been made at a height of 18,500 ft. in the Karakorum; and, lastly, 17 per cent. of all the towns in Bolivia are situated at a height of over 13,000 ft. In Southern Thibet mountain sickness is felt by travellers, at times very seriously, at an altitude of 12,000 to 15,000 ft.; but Shigatse is a town 12,740 ft. high, and Gyangtse stands at 13,000 ft., where a July temperature of 105 degrees has been recorded, whilst from September onward it freezes, and night temperatures of −16 degrees are frequent and even normal in winter.

Woeikof points out that half the human race (806 millions) lives between the 20th and the 40th degrees of north latitude, that is to say, in that very belt of land so often condemned, which is nearer the equator than any part of Europe whatever, and contains, moreover, the greater part of all the deserts in the northern hemisphere. The areas classed as "desert" or "semi-desert," that is to say, those that receive less than 20 inches of rain in the year, actually form altogether three-fifths of all the land above sea level. And they are by no means negligible countries (a matter of immense importance to Australia, since a great part of our own area comes under that category); it was precisely in those desert and semi-desert areas that there arose, without exception, the ancient civilisations, both of the old and the new world.

Time does not permit me to refer in any detail to those great chapters in the mighty story of civilisation, and I regret it, because our education persistently ignores them, to concentrate upon the age of Pericles, from which we draw our civilisation, as though its splendour blotted out the equal grandeur of its predecessors.

To us, the Golden Age of Greece, as the source and origin of our own intellectual ascendancy, is the beginning of civilisation; as a matter of fact, it was the end product of all the mighty civilisations that had gone before it, not a few of which had transcended it, including that ancient Egypt that could declare to Solon that the Greeks, in their heyday, were "mere children, loud-mouthed and vain, with no knowledge of the past"; including the civilisation of India; and including those great empires that had repeatedly arisen in Asia Minor.

From time immemorial the Chinese were famous navigators. It is said that as early as A.D. 121 they had invented the compass and sailed the seas from the Persian Gulf to Canton, and from the Malay Peninsula to Australia, New Guinea, and the Philippines, in great junks capable of holding 600 to 700 men, so that the greatest part of the known world looked to China as "Mistress of the Seas." (Some months ago, many feet beneath the surface of a newly discovered gold mine in New Guinea, Australian miners were amazed to find a Chinese bell, one of the trade symbols of their age-long search for pearls and gold. At Port Darwin years ago, excavations for road building in virgin country revealed a Chinese plaque several feet beneath the roots of an enormous banyan, itself a foreign tree.)

Reaching the zenith of her civilisation before ours even began, China declined as a world power after the revolution of A.D. 878, when the foreign merchants were massacred or expelled (was it because they brought epidemic plagues in their ships?) and Chinese voyagers were rigorously restricted to the neighbouring shores. It was not until the thirteenth century that the Mongol invasion once more dragged her from her self-sought isolation into the great maelstrom of world commerce.

As for India, Mookerji points out that—

> For three centuries India stood out as the very heart of the Old World and maintained her position as one of the foremost maritime countries. She had colonies in Pegu, in Cambodia, in Java, in Sumatra, in Borneo, and even in the countries of the further East, such as Japan. She had trading settlements in South China, in the Malayan Peninsula, in Arabia, and in all the chief cities of Persia, and all over the East coast of Africa. . . . During the first few centuries of the Christian era an enthusiastic band of devoted Bengalis, burning with a proselytizing zeal, went so far as China, Korea, and Japan, carrying with them the torch of Buddhistic faith.

Her influence and dominions spread right through the Indonesian chain above our shores, where Chinese had preceded them and Arabs were to follow (and where, indeed, in the Torres Straits, by some dim chance, Egyptians had left the detailed processes of mummification as used in Egypt in the twenty-first dynasty, to be the burial practice of a savage native tribe on Darnley Island).

The Hindus excelled all the nations of antiquity in operative surgery and four hundred years before Christ they had highly developed medical and sanitary systems and public hospitals. Malaria was known and attributed to mosquitoes, a discovery remade by Ross less than

forty years ago; the recently recognised association of rats with plague was observed and recorded; and several other diseases of recent investigation, as, for example, diabetes, were, we are told by Garrison and Jolly, recognised and dealt with. Their methods of operating for cataract, skin grafting, and certain other procedures were adopted into present-day European medicine, and they have provided us with numerous effective drugs for our pharmacopœia.

Apart from these civilisations, we often forget that there is no direct descent between ancient Greece and modern Europe. . . .

It was not until the Arabs from the deserts of Asia Minor burst through the Dardanelles that the learning that had stagnated for a thousand years broke into belated flower. The amazing rise of Europe was to that epoch what the rise of Japan has been to this.

But meanwhile, for a period as long as that during which Great Britain has been a world power, and considerably longer than that during which the United States of America has been in existence, the burning sands of Asia Minor and Africa bred a race of warriors, scientists, and missionaries equal to any later series.

The religion of Mohammed aimed at the conquest of the world, and in less than a century it had actually conquered the world from the Atlantic to the Himalayas and, we are told, but for the sudden death of a caliph, would probably have extended its sway to the Pacific. As Beazley says—

> The last of the Ommiades (A.D. 750) reigned over three-quarters of the empire of Alexander and a quarter of the dominion of Trajan . . . No race has ever shown a greater keenness for the acquisition of knowledge or more favour to the growth of science.

Arnold Wood has added that—

> While Europe sat in darkness, Baghdad became the centre of a splendid civilisation.

In the ninth century the Greek and Roman classics had already been translated into Arabic and had become the inspiration of native Arab scientists, who in their turn, though not until four hundred years later, became the teachers and masters of Christian scholars like Roger Bacon.

Arabian travellers co-operated with Arabian men of science and surveyed every sea from Spain to China, from Cairo to Madagascar, from Java to Canton. Arabian merchants traded and colonised on the east coast of Africa, on the west coast of India, in Sumatra, in Java, and in China. Immediately north of Australia's shores is a little island, west of the Philippines, in the Pelew group, which in its Arabic name of Bab-el-thaob, or "Gateway of the East," demonstrates the far-flung limits of the Moslem power. Well might Sir William Hunter write that "the Indian Ocean became an outlying domain of Islam."

When one turns unbiased attention to these other civilisations which now seem so remote—and perhaps in their remoteness and in our ignorance somewhat trivial—it is difficult, but essential, to realise that it is only six hundred years since the Europe of to-day began to rise from the chaos of semi-civilisation; that it is less than three hundred years since England became a first-class power; and that at that golden age of Greek dominance from which we trace the very phrases, ideas, and habits of thought that mould so much of our public policy, and colour so much of our national outlook, Britain, and indeed all north-west Europe, was primitive to the stage of sordid misery.

The climate has not changed in this tiny section of history. To regard it as the causative factor in Great Britain's rise to power is obviously ludicrous.

To what, then, is due the present eminence of the Anglo-Saxon race, British and American, with its colonies and dominions in every continent?

Every human factor is complex, but to this question we must answer in all humility that one very large element at least was the rounding of the Cape of Good Hope by Vasco da Gama, a Portuguese, and the discovery of America by Columbus, an Italian sailor in the service of Spain.

British history may be said to have begun when those discoveries produced the maritime revolution that closed the middle ages, the revolution that transferred the centre of world politics from the Mediterranean to the Atlantic, effectively and finally checkmating the Mediterranean nations which had monopolised trade with the East through that land-locked sea, and the Moslem, who, by his possession of Asia Minor, had cut the whole of Europe off from the Indian Ocean. Britain, as isolated as Australia, became suddenly the ideal seat and centre for the Atlantic trade, and in one century (and without, mark you, any change of climate) sprang from obscurity to the status of a first-class power.

With trade came wealth, with wealth came food, and with food, health.

There is a whimsical parallel and contrast between ancient Britain and the Australia of 1788, as we know them from contemporary authors.

Australia, we were assured, was one of the poorest of countries, isolated "for ever" from centres of trade, with no natural fruits, with no animals but the dingo and the kangaroo, with a summer climate that was intolerable, and with a vegetation that was no more than a vast monotony of grey-green gums, interspersed with dreary swamps and miles of drab scrub; above all, said the critics, was a fierce sun in a brazen sky, with blinding sunlight and a parched soil never moistened by rain.

The Britain of two thousand years ago was utterly unlike the ideal Britain of our tradition or the man-made gem of to-day. It was, as Vergil said, isolated "for ever" from civilisation by rough seas; it had no fruits but the bitter and uneatable crab apple, and no animals but the wolf. It had great areas of dreary swamp and fen, and a winter climate that the hardy Roman soldiers dreaded worse than death. As for the vegetation, throughout all Europe it was no more than a dreadful monotony of beech, elm, chestnut and oak, that from the northern slopes of the Alps to Ultima Thule buried the country beneath a grey-green pall, rendered ever more melancholy by the lowering skies, the utter sunlessness and the perpetual dripping of the endless rains that soaked its sour soil.

And what of it to-day?

As Emerson says—

England is a garden. Under an ash-coloured sky the fields have been combed and rolled till they appear to have been finished with a pencil instead of a plough. The solidity of the structures that compose the towns speaks the industry of ages. Nothing is left as it was made. Rivers, hills, valleys, the sea itself, feel the hand of a master. The long habitation of a powerful and industrious race has turned every

rood of land to its best use, has found all the capabilities, the arable soil, the quarriable rock, the highways, the byways, the fords, the navigable waters; and the new arts of intercourse meet you everywhere; so that England is a huge phalanstery where all that man wants is provided within the precinct.

What wrought this change in what had been that age-old monotony of beech and oak: Nature, or man setting Nature at defiance?

The story of the human will and human industry that have extended the vegetation of the tropics and the semi-tropics to redeem the colder reaches of the earth from their barren bleakness, is the main theme of civilisation.

The ancient Pharaohs took advantage of their foreign expeditions to introduce exotic plants into Egypt, and were so well aware of the glory due to men who bettered or outwitted Nature that they took to themselves for so doing titles of honour, that we still may read inscribed on their ancient monuments.

By systematic and studied acclimatisation they collected within their country from Western Asia an enormous quantity of plants for food, for industry, and for pleasure, and distributed them, moreover, to all their allies and neighbours. Upon the naturally rugged coasts of a Mediterranean we have never known they grafted that artificial landscape we regard as "typical of Southern Europe." Can you imagine an Italy bare of the olive, the vine, the oleander, the cypress, the plane tree, the lemon, the orange, the almond, the peach, and the mulberry? Yet so it was until Egypt remade it. To all these the Romans added from their conquest the apricot and the pomegranate, among a host of lesser fruits and flowers, and from Italy they carried their fruits to enrich and remodel all Western Europe as far as the Rhine and the Danube, grafting fragments of a new kind of country —a new kind of climate—on natural areas whose disparity with them was complete. In its new French homes, for example (and in spite of the prophecies inspired by that pessimistic conservatism that seems inseparable then, as now, from the academic-minded), the vine flourished so exceedingly everywhere that in the middle ages a canton of Toulon-sur-Arroux "took its name (Sanvignes) from its almost unique incapacity to nourish that plant of hot climates" (Lefèbvre).

The olive similarly, foreign to both Italy and Africa until two centuries after the foundation of Rome, had been naturalised there so successfully that it became the commonest of fruits and now was carried "with painful care into Spain and Gaul" (Gibbon).

Flax, too, was transported to Gaul from Egypt, and enriched the whole country; and the use of artificial grasses, including in particular lucerne (which came originally from Media in Asia Minor), became a familiar boon to European farmers.

In Britain, however, up to the end of the middle ages, the process was rudimentary and famine always followed a bad harvest. During the winter there was not enough pasture for the flocks, and it was the custom to kill and salt, smoke or dry the flesh of all but the best beasts. Even so, the people's ration was so meagre that scurvy was appallingly rife. The introduction of new fruits, vegetables, and fodders from abroad—the most permanent of the "fruits of conquest"—came with the maritime revolution and England's consequent rise to world power. To the curious student her importations set her former poverty in high

relief. Plimmer points out, for example, that the use of greens and salads was introduced only by Catherine of Aragon, wife of Henry VIII., and that, as the English were ignorant of the growing of greens, she was forced to import a gardener from Holland, where possibly the people had learned the art while subject to Spain.

The potato, so important a factor in our everyday life, was brought to England from its home in the dry Andes of South America in 1565 (and incidentally was regarded at the outset with indignant hostility as "unchristian" pig food); while the planting of root crops, such as the turnip, dates only from the middle of the seventeenth century.

Custom turns a casual corner and civilisations rise or fall.

Osborne, commenting on the decline of Rome, once pointed out that no description of the causes that bore down that mightiest of empires was complete if it omitted "Baltic herring and Egyptian wheat." No history of the rise of Great Britain is perfect if it omit the introduction of the foods that permited her flocks and herds to be carried safely through the winter and added to the diet of her people those elements that foster vigour and initiative. For 3,000 years the potent British stocks lay latent in an obscure island; in three hundred they overran the whole globe.

When, less than a century ago, the microscope conquered superstition, science found the Anglo-Saxon in every climate clinging grimly to half the world. The coloured races of the tropical lands laid luxurious tributes at the feet of their new lords, and the diseases rife in their new dominions struck them down in thousands as they took them up.

In the West Indies, for example, 3,000 white men died in one small island in one year; and in Africa and in India the record was no less dreadful. It is recorded that a King's ship "Tiger," cruising on duty off the Barbadoes, out of a crew of originally 220, lost 600 men from yellow fever in two years, the master of the vessel, as he reported, "still pressing men out of merchant ships that come in, to recruit my number in the room of those who died daily."

The lot of the soldier in India makes startling reading. Statistics are out of place perhaps in a lay oration, but you will permit me a moment's latitude to take you back a century. From 1832 to 1838, inclusive, in Fort William, India, out of every 1,000 soldiers there were 1,883 admissions to hospital every year, and the annual deaths were seventy-three. At Chinsurah depôt, 12 miles from Calcutta, from 1826 to 1837, of every 1,000 of the troops there were 1,930 admissions to hospital, with 73.7 deaths annually. That was the mortality on the spot only, and does not include the invalids who died on the passage to England or shortly after their arrival there; these were sufficient to bring the deaths to more than eighty per 1,000 annually. As service in India is permanent, or, rather, leave of absence was allowed to those who chose to return to Europe for three years after ten to fifteen years of service, it will be noted that in the tenth year less than two hundred would survive out of every 1,000 soldiers sent to India.

And what were the diseases? They were diseases that at the present day are almost wholly preventible. Out of every 1,000 soldiers dying in Bengal, Burke stated that 268 died from "fever," 378 died from bowel complaints and liver abscesses, 195 died from cholera, 46

died from tuberculosis or other respiratory diseases, leaving a meagre total of 110 in every 1,000 to die from every other kind of disease whatever.

I have already referred briefly to the fact that as recently as the girlhood of Anne MacKenzie it was commonly accepted that the causes of epidemic fevers and diseases were either cosmic, atmospheric influences, or miasms from "the bowels of the earth"; that the localisation of particular forms of disease was supposed to be due to "local peculiarities" of men and climates; and that, as William Stokes (1804-1878), following Sydenham, asserted, diseases were not specific and separate but that "the same exciting cause is capable of producing different kinds of fever in different persons."

Since no distinction was known between fevers, except the mere fact of locality, all were treated alike, and the death rate was enormous. The treatment was directed towards expelling the supposed evil matter, and was as follows:—First, repeated bleeding, 25 to 50 oz. of blood being withdrawn (and many a patient was bled to death, as is obvious from the case notes); secondly, violent purgation; thirdly, cold and tepid affusions; fourthly, mercury, pressed to the point of poisoning and the production of salivation; fifthly, violent emetics were used to reinforce the effect of violent purges (though this was passing out of favour); and sixthly, diaphoretics were used to "sweat the poison from the body," to use the present day phrase of the man in the street. In the last stage of treatment tonics and stimulants, including quinine bark, wine, and opium, might be employed.

The only drug valuable in malaria—and malaria must have represented a very great proportion of all the cases—is mentioned in one word on one page in an account of the treatment of fevers that traverses nine pages of close print. It is not otherwise referred to, except in condemnation, in Johnson and Martin's standard text-book of 1841, though Johnson states that, on account of the variability in symptoms seen, he "shall not attempt to deny that there may be cases wherein the the use of wine, and even bark (quinine) is indispensable."

Into this tragic confusion came the microscope, a magic index of bacteria and parasites, that steadily and rapidly dispersed that comfortable smoke screen of ignorance, "climate," replacing it by clear pictures of visible causes.

As early as 1546 Fracastorius, a famous Italian doctor, had, so Garrison tells us, described contagion as being due to "*seminaria contagionum*"—germs—that were able to grow and multiply; and had quite clearly expounded the relation between infection and epidemics. Nevertheless, it was only between 1870 and 1900 that a series of brilliant successes decided the struggle between science and the speculative philosophy that had usurped the throne of scientific observation.

In 1872 Lewis in India discovered that the micro-filaria lived normally in the blood of persons infected with filariasis and the fever that accompanied it; in 1873 Obermeier saw first the spirochæte that is the essential cause of relapsing fever; and in 1874 Hansen demonstrated the bacillus of leprosy. In 1878 Manson, the "Father of Tropical Medicine," found that a mosquito, an insect vector, was the indispensable carrier that conveyed filariasis from man to man. He had effected a revolution in medical thought.

From 1880 to 1894 there were determined, among other things, the causative organisms of suppuration, typhoid fever (1880), malaria (1880), glanders (1882), tuberculosis (1882), cholera (1883), diphtheria (1883-4), tetanus (1884), undulant (Malta) fever (1887), cerebro-spinal meningitis (1887), and plague (1894); and man, running hot-foot in the sudden consciousness of victory, soon discovered how to outwit Nature by protective inoculation against anthrax, tetanus, hydrophobia, cholera, diphtheria, and typhoid.

Three years later (1897), Shiga and Kruse had detected the germ cause of bacillary dysentery, and Tictin had found that relapsing fever was conveyed by the bed bug, the louse and the tick being incriminated also later. But in that year (1897-8) Ronald Ross, on Manson's advice, and with his encouragement, finally demonstrated the rôle of the mosquito in the transmission of malaria, and for the first time laid down the measures that would ultimately vanquish that "principal and gigantic ally of barbarism."

The microscope revealed and classified ever-increasing numbers of parasites from the blood, the body tissues, the urine, and the bowel contents; while in the laboratories scientists grew on culture media the "demons that produced corruption of the air and pestilences" and bottled in test tubes the different organisms whose varying effects on the human body had been ascribed to "differences due to climate."

Thus, in the short span of thirty years, climate was absolved from the burden of guilt it had borne unjustly for thirty long centuries.

In the tropics the effect of this new lead in scientific thought was enormous. With the development of national greatness social standards had so improved in Great Britain during the previous two hundred years that the commoner epidemic plagues had largely disappeared; leprosy had gone with the middle ages, plague disappeared after 1680, malaria was increasingly rare, and cholera only an occasional dreaded visitant. But among the teeming poor of the rich and populous East, the most fatal plagues were still so common that, forgetting Europe's former subjection to these same scourges, they were called "tropical diseases." I must emphasise that point.

Many diseases called "tropical" are merely diseases which have their greatest distribution where social and sanitary conditions are primitive, or grossly defective, and nowhere is this the case more than in the tropics. Plague, cholera, typhus, smallpox, dysentery, leprosy, and malaria have all raged at times in Europe and were only recently controlled, some foci still existing. It was in the tropics, however, that they were rampant, and it is to the tropics that we look for those victories to which each year adds new examples.

Moreover, as Manson long ago pointed out, heat and moisture are responsible for an amazing fertility in tropical countries—in men, in animals, and in plants; and this applies equally to bacteria, parasites, and the insects that act as their vectors. Since the fly, the tick, the mite, and their more scandalous colleagues, the flea, the bed bug, and the louse, have been found equally guilty with the mosquito as porters of disease, it is obvious that in the areas of their greatest prevalence, and earth's greatest profusion, man must fight this grimmest battle for survival.

Before Hercules may win the golden apples of the Hesperides and the delights of Olympus, he still must overcome the fiery dragon that guards the tree and the many-headed Lernean hydra of the swamp.

Here, perhaps, we may spare a crumb to the protagonists of climate and set it in its true perspective, for here, perhaps, is that grain of fact in a bushel of fiction that led the world in its ignorance to set all diseases at its door. Newsholme points out that:—

> In England mild winters and cool summers lower the death rate, the former by decreasing catarrhal infections, and the latter especially by reducing the prevalence of diarrhœa. Hot and dry summers favour the occurrence not only of fatal diarrhœa in the summer, but also of enteric fever in the autumn of the same year. But recent experience shows that hygienic measures are competent to reduce or even to annihilate any excess of these diseases favoured by climatic conditions. Typhus fever and smallpox prevail chiefly in the winter and spring; but they are completely avoidable at all seasons. Pneumonia is much more prevalent and fatal after a cold snap accompanied by fog; and this has been ascribed to the absence of sunshine; the chief agent in causing this result, however, is the low temperature, affecting in particular those of extremes of age, with lowered vitality. Differences of prevalence of disease associated with climatic differences are well known, as, for instance, in rheumatic fever, scarlet fever, diphtheria, and tuberculosis; but in most instances—and still more is this true for the tropical parasitic diseases—the difference is controllable.

Newsholme might have added that the warmth and moisture of the tropics are essential to the presence of the hookworm—that great devitalising factor in native (and even white) communities—a disease that is the only present threat to white colonisation in tropical Queensland (where, up to the withdrawal of the Commonwealth last year from the campaign for control, it had already cost the country £180,000).

Cholera in India has been found by Rogers to be able to reach epidemic proportions only when the degree of atmospheric humidity has reached a certain figure; yellow fever in Central America requires for its development in epidemic form a mean atmospheric temperature of 75 degrees F., and will not spread below it. It is favoured by damp and stopped by cold. Martin and Bacot, in India, demonstrated that the duration of life of *X. cheopis* when fasting was determined by saturation deficiency, and Rogers recently called attention to the fact that a low saturation deficiency meant a high incidence of plague and a high saturation deficiency a low incidence. On all such information forecasts of epidemic probability can be made in these and in other diseases, for investigators, with patience and skill, have determined an infinite number of other minute differences in the life history of parasites and their insect vectors, upon which, to an extent undreamt of, depend the effective implantation, the endemicity, or the epidemic spread of various diseases.

This, then, is the new trend of medical and scientific thought that I present to you. How can we best apply it?

Newsholme answered the query when he said that there is always some controllable aspect of the case; in the tropics this is not only true, but it is the basic problem of progress.

Unless the administrations of tropical countries make health everything, disease makes them nothing.

Time permits me only the briefest illustrations. Nicholls has shown how surely the former civilisation of Ceylon that spread its magnificent monuments from that island throughout the Indonesian chain above our

shores, was destroyed a thousand years ago by the malaria and the hookworm disease that still flourish triumphantly among their ruins; Jones has demonstrated the rôle of malaria in the fall of Greece and of Rome; the history of India is one long catalogue of such disasters; and in the earlier days of South and Central America the white man was repeatedly pushed from his supremacy by yellow fever. Every kind of explanation has been advanced by arm-chair speculation to account for the patchy distribution of the Polynesian and Melanesian races here in Oceania—skin colour, climate, ocean currents, and a dozen others—but it is perfectly obvious that it is the absence or presence of malaria that has determined the local survival or extinction of the Polynesian.

I have chosen Indonesia and Oceania as examples because the factors operative may be studied in the island chains that bound our shores from Java to Fiji, and because one example is the story of the ruin of a great civilisation and the other is largely the explanation of the barren history of New Guinea.

In the great Melanesian chain, in a climate that will grow in profusion almost every tropical product, we are amazed to find primitive and undeveloped tribes on whose shores the successive waves of eastern and western civilisations have spent themselves in vain since the dawn of history. Perhaps nowhere is there a better illustration to-day of the blind brutality with which disease factors and food deficiencies together chain man down to mere animal existence.

The reference to food deficiencies recalls the recent triumphs in the field of dietetics.

Just as the outstanding achievement of last generation was the isolation of the specific bacteria that caused epidemic disease, so the research in this generation that has most seized the attention of the public is the discovery of the unsuspectedly intimate association that exists between food and health. No one now doubts the relation of scurvy, beri beri, and rickets to the lack of some essential constituents in the diet, or denies the existence of the substances called vitamins. But researches into nutrition have demonstrated, even more importantly, that, apart from the prevention of frank disease, a balanced and adequate diet is essential to the vitality of mankind, with all that that implies in fertility, resistance, manliness, energy, and initiative.

Thus McCollum and Simmonds assert with conviction that, short of producing obvious disease, an improperly constituted diet is an important cause of—

> Inferiority in physical development, instability of the nervous system, lack of recuperative power and endurance, with consequent cumulative fatigue; and lack of resistance to infections such as tuberculosis, and other types where specific immunity is not easily developed by the body. In addition to these, the rate of development of senile characteristics and consequently the length of the span of life are greatly influenced by the type of diet to which one adheres.

In New Guinea these hypotheses are amply confirmed not only so far as the natives are concerned, but also among those white men who live on tinned foods. Food deficiencies double all hospital costs; and, indeed, all overhead expenses, by enormously diminishing the efficiency of labour.

How could it be otherwise with the natives at least, whose diet in their own villages, even at its best, is bulky, innutritious, and deficient in fat and in protein, hard to digest with its 15 per cent. to 50 per cent.

of contained fibre, and poor in vitamins A and C? At its best its deficiencies are made up for the more powerful members of the tribe by the growing shoots of plants, certain seedy grasses, ferns and fruits, with the raw liver of fish, or, rarely, of animals, formerly even of men. At its worst it is a compromise with famine, and not always a successful one.

With endemic diseases that prevent all but a minimal foraging for food or cultivation of the soil, and with a consequently faulty diet that still further lowers bodily resistance to those very diseases, is it any wonder that the native often reaches a stalemate, where initiative and industry are lost in the mere struggle for survival?

Nor does the coming of the white man aid him at the outset. The first impact of civilisation is actually to intensify native disabilities, for in New Guinea, it introduced tuberculosis, dysentery, and venereal disease; while disruption of the social organisation of native communities and the introduction of plant pests still further limited foodstuffs. Nevertheless, if we will use them, we can to-day lay the whole world under tribute to redress the balance, for both the diseases and the deficiencies are controllable, though admittedly control is a complex problem.

It is the conquest of environment, and is not this what I called just now the main theme of civilisation? Should not, is not, the whole fabric of social progress built about the co-operation of the producer, the defender, and the equitable distributor of work and wealth, or, as one may more aptly put it for a subject native province threatened with disease and famine, the co-operation of the medical man, the agriculturist, and the anthropologist?

The basic problem in every native community is the problem of health, and medical science has won many victories since Manson, Ross, Reed, Bruce, Rogers, and a host of others brought promise out of chaos. One can do no more than mention the progress that has been made in the control of malaria, hookworm disease, smallpox, plague, cholera, dysentery, relapsing fever, typhus, leprosy, and a host of others. Schistosomiasis yields to the antimony treatment elaborated by Christopherson, while the work of Leiper and others has shown that the parasite develops in water snails vulnerable to attack. Kala azar, which often decimated the richer populated tracts of Bengal and Assam, killing 90 per cent. of those it attacked, has in the last few years succumbed also to the curative properties of intravenously administered antimony. There is the greatest promise in the success that has been secured in the treatment of sprue by lessons learned in the special field of endocrinology. Cholera and plague may now be rapidly stayed by prophylactic vaccines, while the epidemic distribution of the former may be anticipated with certainty and prevented by adequate measures; and rat control and examination are a sound check on the latter. Emetin and other products have enormously reduced the ravages of amœbic dysentery while synthetic chemistry continually adds to the resources available to the physician in the treatment of almost every tropical disorder.

In the field of plant life the endless story of beneficent interchange between the tropical and the temperate regions goes on unceasingly.

I have referred previously to the part Egypt played in remoulding the countries of the Mediterranean from the rich plant life of Western

Asia; to the dissemination throughout all Europe of those benefits by the Roman conquests; and to the continual additions that have varied life, ameliorated hardship, and multiplied resources since the great tropical areas of the old and new worlds were thrown open by explorers and traders.

In the last 300 years, and especially in the last century, our dependence upon the tropics has grown to an enormous extent—an extent that is masked by long every-day familiarity. We draw on the tropics for such common articles as our indispensable beverages—tea, coffe, and cocoa; the coconut oil that produces many of our soaps, the tung oil that blends the paints of our houses, and all kinds of fibres of industrial importance, such as sisal-hemp, cotton, silk, jute, kapok, and so on. From the tropics we have obtained hundreds of medicinal drugs, spices, aromatics, and dyes, as, to give the first examples that occur to me, quinine, castor oil, ipecacuanha, quassia, strophanthus, ephedrine, chrysarobin, chaulmoogra oil, and camphor; sugar, pepper, nutmeg, cloves, cinnamon, cochineal, coconut, and curry powder. The veneer woods of the tropics are general in our homes, and fruits such as bananas, pineapples, and dates are common on our tables; sago, tapioca, and rice are universal, while rubber, both raw and vulcanised, has infinite uses, from pavements to palates.

Moreover, many tropical products have been successfully adapted to actual growth in temperate climates, and, apart from the potato, include melons, beans, sweet potatoes, ginger, tobacco, rice *et cetera*, besides oils, nuts, gums, and fibres in great variety.

From the enormous resources of the tropics the mechanical ability and initiative of progressive races are daily adding new comforts and resources to civilisation, besides improving the product itself. Immediately above our shores the Dutch in Java have cultivated cinchona to such excellence that they have transplanted quinine production from the Andes to the East Indies; and in like manner rubber growing has been taken from the Amazon to the Orient, while Java produces a better palm oil than Africa does.

I select these examples because they occur in the great Indonesian chain with which our tropical possessions are continuous.

In Australia, beginning from the other end of the scale, we have queerly reversed the process of adaptation. The tenacity of our explorers and pioneers gave us a heritage stretching from the equator through more than 40 degrees of latitude (a heritage extended last month to the South Pole itself), and the conservatism we inherited no less from our European ancestors harnessed it to the task of growing English products in the English way for the English-speaking markets. Indeed, holding as an article of faith the idea that white men cannot live in the tropics, Australia, paradoxically, has not only successfully implanted her people for several generations in a tropical and subtropical land, but has coerced it into the semblance of the homelands from which we have come. We have taken a country that, climatically speaking, is everywhere utterly different from the British Isles and that, with the exception of the tiniest moiety of South Victoria, is everywhere closer to the equator than any part of Europe whatever, and in those areas that pre-eminently owe their allegiance to the tropics we have produced in increasing profusion the fruits and products of temperate and even cold lands.

Man once again has demonstrated, as Lefèbvre claims, that—

> Humanity escapes more and more from blind determinism, from the mechanical causality of his environment. Man is more and more the master of Nature and would be still more so did he utilise better the resources he has created, and had he a less vacillating idea of civilisation.

In that struggle for progress which, I repeat, is pre-eminently the establishment of a beneficial accord between man and his constantly changing environment, human will is the dominating factor, and nowhere perhaps is this more important than in the Australia of this and the next generation.

We claim exclusively a semi-tropical and tropical continent, originally free from endemic disease; we have the suzerainty in New Guinea of a native dependency that can be to Australia what the Dutch East Indies have been to Holland; we stand perhaps on the threshold of events as revolutionary as those that transferred the seat of world interest from the Mediterranean to the Atlantic, for events are every day more clearly demonstrating the increasing importance in world politics of the Pacific. The conquest of tropical disease has placed in our hands the key of our destiny, and we may well take stock of our responsibilities and our resources.

Lawrence Lowell said some years ago—

> It is hardly an exaggeration to summarise the history of four hundred years by saying that the leading idea of a conquering nation in relation to the conquered was, in 1600, to change their religion; in 1700, to change their trade; in 1800, to change their laws; and in 1900, to change their drainage. May we not say that on the prow of the conquering ship in those four centuries first stood the priest, then the merchant, then the lawyer, and finally the physician?

It is true, but there is a greater lesson: in that greatest of all the problems that confront Australia—the demonstration to the world that we are capable of developing successfuly the greatest remaining accessible tropical area, and of bringing the scattered tribes of Melanesia out of their wilderness of famine and disease into the security of settled government and productive life—we require the intimate co-operation of all four, though, truly, with the recognition of the fact that, in tropical lands, health is the foundation upon which every other developmental activity must rest.

In Australia we have a greater population, purely white, living in the tropics than any other country in the world can boast, and these white men and women of the second and third generations live there without any loss of mentality, physique, or fertility. It is the demonstration to the world (admittedly largely an unconscious experiment, successful owing to the absence of any teeming native population riddled with disease, but, nevertheless, an outstanding demonstration) that the conquest of climate is primarily, essentially, the conquest of disease.

That once achieved, we may say, as Shelley sings:—

> All things now are void of terror: Man has lost
> His desolating privilege, and stands
> An equal amongst equals. Happiness
> And science dawn, though late, upon the earth;
> Peace cheers the mind, health renovates the frame;
> Disease and pleasure cease to mingle here;
> Reason and passion cease to combat there;
> While Mind, unfettered, o'er the earth extends
> Its all-subduing energies, and wields
> The sceptre of a vast dominion there!
>
> —*Shelley*, "Daemon of the World," lines 458-467.

AGRICULTURE ON THE AIR.

Radio Lectures on Rural Subjects.

Arrangements have been completed with the Australian Broadcasting Commission for the regular delivery of further radio lectures from Station 4QG, Brisbane, by officers of the Department of Agriculture and Stock.

On Tuesdays and Thursdays of each week, as from the 3rd April, 1934, a fifteen-minutes talk, commencing at 7.15 p.m., will be given on subjects of especial interest to farmers.

Following is the list of lectures for April, May, June, and July, 1934:—

SCHEDULE OF LECTURES.

BY OFFICERS OF THE DEPARTMENT OF AGRICULTURE AND STOCK, RADIO STATION 4QG, BRISBANE (AUSTRALIAN BROADCASTING COMMISSION).

Tuesday, 3rd April, 1934—"The Control of Tobacco Diseases in the Field." By L. F. Mandelson, B.Sc. Agr., Assistant Plant Pathologist.

Thursday, 5th April, 1934—"The Deficiency of Winter Feeding on Natural Pastures." By J. L. Hodge, Instructor in Sheep and Wool.

Tuesday, 10th April, 1934—"Cabbage Pests." By J. A. Weddell, Assistant Entomologist.

Thursday, 12th April, 1934—"Health of Dairy Herds." By J. C. J. Maunder, B.V.Sc., Veterinary Surgeon.

Tuesday, 17th April, 1934—"Lucerne Diseases." By R. B. Morwood, M.Sc., Assistant Plant Pathologist.

Thursday, 19th April, 1934—"Prevention and Treatment of Some Common Ailments of Dairy Cattle." By J. C. J. Maunder, B.V.Sc., Veterinary Surgeon.

Tuesday, 24th April, 1934—"Some Breeds of Poultry." By P. Rumball, Poultry Expert.

Thursday, 26th April, 1934—"Principles of Housing Poultry." By J. J. McLachlan, Poultry Inspector.

Tuesday, 1st May, 1934—"Squirter Disease of Bananas." By J. H. Simmonds, M.Sc., Plant Pathologist.

Thursday, 3rd May, 1934—"Working and Care of Separators." By F. J. Watson, Instructor in Dairying.

Tuesday, 8th May, 1934—"The Profitable Life of a Fowl." By P. Rumball, Poultry Expert.

Thursday, 10th May, 1934—"Replacement of Poultry Flocks." By J. J. McLachlan, Poultry Inspector.

Tuesday, 15th May, 1934—"Apiary Equipment." By Henry Hacker, Entomologist.

Thursday, 17th May, 1934—"Care of Cream on the Farm." By F. J. Watson, Instructor in Dairying.

Tuesday, 22nd May, 1934—"Problems of the Dairying Industry." By C. F. McGrath, Supervisor of Dairying.

Thursday, 24th May, 1934—"The Scientific Use of Stock Licks for Sheep." By J. L. Hodge, Instructor in Sheep and Wool.

Tuesday, 29th May, 1934—"Fat Lamb Raising as Combined with Agriculture." By J. Carew, Senior Instructor in Sheep and Wool.

Thursday, 31st May, 1934—"The Effect of Parasites in Sheep and Methods of Control." By J. Carew, Senior Instructor in Sheep and Wool.

Tuesday, 5th June, 1934—"Pineapple Wilt." By H. K. Lewcock, M.Sc., Assistant Plant Pathologist.

Thursday, 7th June, 1934—"The Frozen Pork Trade." By E. J. Shelton, Senior Instructor in Pig Raising.

Tuesday, 12th June, 1934—"Insect Pests of Ornamental Trees and Shrubs." By A. R. Brimblecombe, Assistant to Entomologist.

Thursday, 14th June, 1934—"All Fresh is Grass—A Great National Asset." By J. F. F. Reid, Editor of Publications.

Tuesday, 19th June, 1934—"Selection and Mating of Poultry." By P. Rumball, Poultry Expert.

Thursday, 21st June, 1934—"Rearing and Feeding Chickens." By J. J. McLachlan, Poultry Inspector.

Tuesday, 26th June, 1934—"Grain Pests." By Robert Veitch, B.Sc., F.E.S., Chief Entomologist.

Thursday, 28th June, 1934—"Grading Pork and Bacon Carcasses." By E. J. Shelton, Senior Instructor in Pig Raising.

Tuesday, 3rd July, 1934—"Results of Disease-resistance Trials with Cane Varieties." By A. F. Bell, Sugar Pathologist.

Thursday, 5th July, 1934—"Intensive Cane Cultivation and Costs of Production." By Dr. H. W. Kerr, Director, Bureau of Sugar Experiment Stations.

Tuesday, 10th July, 1934—"Preparing Pigs for Show." By L. A. Downey, Instructor in Pig Raising.

Thursday, 12th July, 1934—"The Principles and Practice of Pig Feeding." By L. A. Downey, Instructor in Pig Raising.

Tuesday, 17th July, 1934—"Plants Poisonous to Stock." By C. T. White, Government Botanist.

Thursday, 19th July, 1934—"Plants Poisonous to Stock." By C. T. White, Government Botanist.

Tuesday, 24th July, 1934—"A Ramble in Rural England and Its Lessons." By J. F. F. Reid, Editor of Publications.

Thursday, 26th July, 1934—"An Excursion to Scotland—Live Stock Studies." By J. F. F. Reid, Editor of Publications.

Tuesday, 31st July, 1934—"Queensland—A Fruitful Country." By J. F. F. Reid, Editor of Publications.

OUR TRADE WITH GREAT BRITIAN.

The annual report of the Australian Association of British Manufacturers makes interesting reading. It shows, for instance, that Great Britain's percentage of Australia's imports has increased from 38.4 per cent. in 1930-31 to 39.5 per cent. in 1931-32, and to 42.1 per cent. in 1932-33, which is larger than that of 1929-30. It states also that, in the Commonwealth, tariff reduction has coincided with a period of substantially increasing employment. The Ottawa Agreement is discussed, and the hope expressed that from now on programmes of inquiries arranged by the Board will consist largely of matters that are dealt with as the result of specific requests my United Kingdom interests, through the British Government. One of the most serious developments of the past year, it states, is the phenomenal growth in the intensity of Japanese competition with British goods in the Australian market, and the report urges that the provision that all imported china and earthenware must be indelibly marked to indicate the country of origin, which came into force on 1st September, 1933, should be extended to cover other goods in which British manufacturers are faced with intense foreign competition. In regard to certain piecegoods, words indicating origin are to appear, after 1st February, 1934, on the selvedge of the cloth, every two or three yards. The association has also urged that action should be taken by the Australian Government under the Industries Preservation Act and "dumping preference" duties be imposed on goods from countries with depreciated currencies. But the Government is faced with difficulties in view of Australia's highly favourable trade balance with Japan.

What should have been one of the principal tasks of the Ottawa Conference seems to have been unaccountably overlooked—the setting up of a central general committee to study and advise on the problems arising now that the Dominions and Colonies and the United Kingdom are being linked together, more or less, fiscally and economically. Recent experience raises the problems of South African Government subsidies to Italian shipping, the importations of manufactures from the Far East, and the question what can the Far East take in return, to say nothing of inter-Empire competition in Colonial markets. Mr. Bruce, the Australian High Commissioner in London, now suggests that such a body should be created to study these and other complicated problems. If misunderstanding is to be prevented and grievances assuaged, such a body is indispensable.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock, which have qualified for entry into the Advanced Register of the Herd Book of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Ayrshire Cattle Society, production charts for which were completed during the month of February, 1934 (273 days period unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (OVER 5 YEARS), STANDARD 350 LB.				
Empress 9th of Rosemount	C. O'Sullivan, Greenmount	12,854·25	523·824	Bright Star of Cosey Camp
Star of Alfavale	W. H Thompson, Nanango	13,632·25	516·323	Greyleigh of Greyleigh
Beauty of Headlands	J. A. Heading, Cloyna	11,905·013	500·649	Beauty's Lad of Hillview
Roan 8th of Oakvilla	H. Marquardt, Wondai	13,897·53	497·069	Victory of Greyleigh
Myra 4th of Kilbirnie	Macfarlane Bros., Radford	12,919·77	492·373	Redman of Burton
Daisy 9th of Oakvilla	H. Marquardt, Wondai	10,705·06	414·34	Victorious of Oakvilla
Coronation of Happy Valley	R. Radel, Biggenden	8,575·25	351·56	Guiding Star of Blacklands
JUNIOR, 4 YEARS (UNDER 4½ YEARS), STANDARD 310 LB.				
Pigeon 16th of Upton	H. Marquardt, Wondai	12,300·22	440·954	Kinsman of Greyleigh
Carnation X. of Oakvale	S. H. Teese, Veresdale	10,005·45	382·510	Mallow of Oakvilla
JUNIOR, 3 YEARS (UNDER 3½ YEARS), STANDARD 270 LB.				
Mountain Home Olive	M. C. Lester, Laidley Creek West	8,885·75	333·296	Headlight of Greyleigh
Flower Girl of Blacklands	A. Pickels, Wondai	7,140·55	309·391	Fussy's Monarch of Hillview
SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.				
Envy 8th of Blacklands	A. Pickels, Wondai	7,697·45	299·864	Fussy's Monarch of Hillview
JERSEY.				
MATURE (OVER 5 YEARS), STANDARD 350 LB.				
Shamrock Farm Jean	J. Hunter, Borallon	9,633·96	574·112	Shamrock Farm Palatine
Lindley's Creamery 4th	A. Bulow, Mulgeldie	10,941	556·095	Lindley Billy Hughes
Kelvinside Ideal's Noble's Idol	R. and J. Williams, Glencliff	8,141·1	486·598	Noble of Yaralla

Senior, 4 Years (over 4½ Years), Standard 330 lb.				
Oxford Amy	E. Burton and Sons, Wanora	6,547·75	374·748	Trinity Ambassador
Junior, 3 Years (under 3½ Years), Standard 270 lb.				
Glenview Flora	F. P. Fowler and Sons, Coalstoun Lakes	4,739·6	295·133	Glenview Emperor
Junior, 2 Years (under 2½ Years), Standard 230 lb.				
Bee of Inverlaw (365 days)	R. J. Crawford, Inverlaw	7,775·15	422·236	Bruce of Inverlaw
Glenview Echo Belle	F. P. Fowler and Sons, Coalstoun Lakes	5,270	338·134	Carlyle Larkspur's 2nd Emperor
Trinity Golden Wattle	A. Bulow, Mulgeldie	5,657	289·138	Trinity Field Marshal
Glenview Miss Etterey	F. P. Fowler and Sons, Coalstoun Lakes	3,946·95	255·235	Trinity Glenview Governor

AYRSHIRE.

Mature (over 5½ Years), Standard 350 lb.				
C. F. Vixen	F. C. Maun, Yarranlea	10,454·8	396·638	Longland's Roland
Junior, 3 Years (under 3½ Years), Standard 270 lb.				
Fairview Ode	R. M. Anderson, Southbrook	10,489·88	413·052	Longland's Bonnie Willie I.
Junior 2 Years (under 2½ Years), Standard 230 lb.				
Auchen Eden Rosebud	J. N. Scott, Camp Mountain	6,084·46	248·886	Benbecula Majestic

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PLATE 118.—A CHAMPION MIDDLE WHITE SOW.

Conformation, quality, pedigree, temperament, all important qualifications in selection of breeding stock, are emphasised in this modern representative of the Middle White breed.

PLATE 119.

A picturesque farm homestead on the property of Messrs. P. C. Gorrie and Son, Esk, Brisbane Valley.

Photo. by courtesy Brisbane "Courier-Mail."]

PLATE 120.
Obi Obi Creek, Queensland.
Photo. by courtesy Brisbane "Courier-Mail."]

Answers to Correspondents.

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril T. White, F.L.S.

Western Grasses.

McN. (Charleville)—

1. *Brachiaria piligera.*—This grass is very common in Western and Northern Queensland. It is a native species, but so far as I have observed grows mostly on old cultivation lands, along railway embankments, &c., or, in fact, anywhere where the ground has been disturbed. It seems to prefer such situations to the ordinary pasture. It is quite a good fodder grass, but we have not heard a local name applied to it.

2. *Brachiaria Gi'esii.*—This grass is fairly widely spread in Western Queensland, and, like the other species, rather favours country where the ground has been disturbed, but is not confined to such situations. We have had no experience with it as a fodder, but most of the *Brachiaria* are quite good fodder grasses, nutritious, and relished by stock.

Brachiaria is one of the genera split off from Panicum.

A Beautiful Native Flowering Tree.

J.M.A. (Montville)—

The specimen is *Pithecolobium grandiflorum*, a native of Eastern Queensland, and a very beautiful native flowering tree. We have not heard a common name applied to it. The genus *Pithecolobium* is widely spread over the tropical regions of the world, and is abundantly represented in the forests of South America, where some of the species are known as Monkey's Earrings on account of the peculiar twist in the pod. The pod is almost as beautiful as the flower. It is yellow on the outside, becomes very twisted, splits open, is red on the inside, and has bright black seeds. These black seeds, showing up in contrast against the red background, are very effective.

Button Grass.

C.K. (Maryborough)—

The specimen is *Dactyloctenium ægyptium*, the coastal Button grass. This grass seems to be liked by stock, and is worth planting in seaside localities. It is of annual growth, however, and dies out on the approach of the colder weather. Usually it lasts till somewhere about the middle of March. It is very common in North Queensland, but is evidently on the spread southwards.

How Botanical Specimens Should be Sent.

Mr. W. Worthington, of Proserpine, writes:—

I am greatly interested in your description of grasses and plants in the "Queensland Agricultural Journal," and would like to send some to you to classify. Would you inform me how and what to send, do you require all the complete stool of grass or would the seed stalk do, also how to pack same. I am sure a lot of your readers would send on specimens if they had some instructions printed in the "Queensland Agricultural Journal."

Mr. White's reply:—

I would be very pleased to identify and report on any specimens of grasses and other plants you care to send me. Of grasses the whole stalk doubled up so as to fit comfortably in a piece of newspaper should be sent. It is as well to include in the folder several additional seed heads. Of weeds, trees, &c., a flower or seeding stalk a few inches long should be sent.

Specimens may be sent fresh, though there is always a big chance of their becoming mouldy in transit. The best way is to dry the specimens flat between several thicknesses of newspaper for several days before sending, changing the papers several times until the specimens are perfectly dry. When sending more than one specimen, each should be numbered and a duplicate retained, when names will be forwarded corresponding to the numbers.

Kangaroo Apple.

W.B. (Dalby)—

The plant is *Solanum aviculare*, commonly called Kangaroo Apple. It is a native plant that often comes up as a weed, particularly after a scrub burn. The berries are poisonous, and the young plants have also been regarded as poisonous to sheep. We would be very pleased to name and report any specimens you care to send from time to time. No charge is made for this service.

Guinea Grass.

T.T. (Birkdale)—

The grass is Guinea Grass, *Panicum maximum*. This is generally regarded as one of the best tropical grasses. For many years it did not seem to take on very well in Queensland, but judging from the number of specimens recently received, people seem to be taking a renewed interest in it. Stock are quite fond of it, and a small paddock of this grass for feeding down or cutting would be a decided asset. In Queensland it is often seen as a very common weed in orchards.

"Mistletoe Tree" and Other Poisonous Plants.

INQUIRER (Brisbane)—

The tree referred to as "Mistletoe Tree" is *Euphorbia tirucalli*, a native of Mexico, now cultivated as a succulent in most warm countries. The sap is very irritating, and if it gets into the eyes causes severe pain and temporary blindness. The branches, however, have to be broken, and if the plant is not overhanging paths no trouble should arise from it.

There are many plants commonly cultivated in gardens that are poisonous. One of the most commonly cultivated shrubs in Brisbane is the Oleander (*Nerium oleander*). The leaves of this plant are poisonous, and several cases of dairy cattle having been poisoned by trimming the bushes or by eating garden trimmings have come under our notice. A shrub cultivated fairly extensively is *Acokanthera*, more commonly known to gardeners as *Toxicophlæa*. The fruit of this is very poisonous. In the Botanic Gardens there is a tree, *Strychnos nux-vomica*. This tree fruits very heavily, but the seeds are the source of the very poisonous alkaloid strychnine. Some plants cause mechanical injury. The various Primulas, including *Primula malacoides*, give some people who handle them a severe skin rash, though other people are unaffected. One of the most popular plants is Bougainvillea, but the spines of this affect some people very badly if they happen to get torn or pricked by them. This list is not by any means exhaustive, and there are many plants cultivated in gardens which are dangerous, but surprisingly few accidents occur from them.

Spear Thistle—A Nutritious Legume.

"ANXIOUS READER" (Rockhampton)—

Your specimens have been determined as follows:—

(1) *Cnicus lanceolatus*, Spear Thistle. This is common in Queensland, New South Wales, and Victoria, and is the thistle generally spoken of here as the Common Scotch Thistle. The true heraldic thistle, however, of Scotland is a slightly different plant. Stock, particularly horses, eat the seed heads very freely in spite of the prickly nature of the plant. Its room, however, is preferable to its company. The plant seems to come in cycles, sometimes overrunning a district and then more or less dying out. During the past season it seems to have been particularly abundant everywhere.

(2) *Phaseolus lathyroides*. You speak of this plant as somewhat like a sweet-pea in growth. The specific name, *lathyroides*, refers to the similarity. It was introduced into Queensland as a fodder some years ago, and since then has spread fairly widely in the State. It has been spoken very highly of as a stock food, but here it seems to be very variable in this respect. In some places stock eat it quite readily, hardly touching it in others. I have not heard a local name applied to it. It is a leguminous plant and quite nutritious.

Canada Fleabane.

D.P.K. (Kilcoy)—

The plant you forwarded under the name of Rag Weed is Canada Fleabane, *Erigeron canadensis*. Two species of *Erigeron* are very common in Queensland—namely, *Erigeron linifolious*, a very tall, coarse-growing one, a common weed on scrub farms, particularly in banana plantations; the other is a greener plant, a common weed of cultivation, but extending more into the general pasture. We quite agree with you that this plant reduces very considerably the carrying capacity of the pasture. Nevertheless, we have had reports from farmers and pastoralists stating that they are readily eaten by stock. Probably the animals are making the best of a bad job.

A Beneficial Plant (*Grewia polygama*).

Inquirer (Melbourne)—

The specimen is *Grewia polygama*—the only knowledge we have about this plant is that it is very freely used in North Queensland as a remedy for diarrhœa and dysentery. The leaves are soaked in water overnight or maybe hot water is poured on them and the liquid allowed to become cold. It forms a somewhat mucilaginous liquid and is said to be very efficacious. We understand that in some parts of the North it is quite an article of trade, not only in North Queensland but in the Northern Territory and right over to the north-west of Western Australia.

Tree Tomato.

F.H. (Graceville)—

As far as can be told from the single leaf, the specimen is the Tree Tomato, *Cyphomandra betacea*. This plant belongs to the same family (Solanaceæ) as the tomato, but has a very different tasting fruit. They can be eaten either raw or stewed and have a peculiar flavour of their own not quite like anything else. Sometimes in excessively wet weather the plants lose their leaves, but often recover when the weather becomes drier. If you think your plant is dying and you wish to replace it, you can try taking off some of the young shoots at the top and putting them in as cuttings.

Leafy Panic Grass.

W.H. (Dagun, near Gympie)—

The grass is *Brachiaria foliosa*, the Leafy Panic Grass, a native grass and quite a good fodder for stock. It is sometimes found in the mixed native pasture, but on the whole rather prefers soil that has been broken or disturbed in some way, such as old cultivation paddocks, &c.

Carpet Grass—Crow Foot Grass.

L.R.B. (South Johnstone)—

(1) *Axanopus compressus*, the Broad-leaved Carpet Grass. This grass has gone under other names, such as *Paspalum compressum* and *Paspalum platycaule*. Two forms of it occur in Queensland, the narrow-leaved and the broad-leaved varieties respectively. We think the broad-leaved one is the better of the two, and is quite a suitable grass for tropical localities such as Innisfail. Of recent years this grass has come into Southern Queensland, and farmers are rather perturbed about its ingression into Paspalum pastures, as it has not the carrying capacity of the common Paspalum (*Paspalum dilitatum*). So far as our observations go, however, this latter species does not do well in really tropical localities such as Innisfail.

(2) *Eleusine indica*, Crow Foot Grass. This grass is very widely spread over the warmer regions of the world and is mostly found as a weed in cultivation, around back-yards, calf pens, &c., or in fact anywhere where the ground has been disturbed. It is not often found in the general pasture. Stock seem very fond of it, and, though we have had no losses from it in Queensland, it contains, like young Sorghum and some other plants, prussic-acid glucoside. Fed with caution, however, no trouble should be experienced from it.

SHEEP LAND FOR GRAZING SELECTION.

Oondooroo Resumption.

OONDOOROO resumption is situated on the Longreach-Winton Railway, in the Winton land agent's district, about ninety-five miles south-westerly from Hughenden, and embraces three portions with areas ranging from 24,000 acres to 26,000 acres. The portions will be opened for Grazing Homestead Selection at the Land Office, Winton, on Tuesday, 15th May.

The term of lease will be twenty-eight years, and the annual rental will be twopence half-penny per acre for the first seven years of the term.

The portions consist of good fattening and woolgrowing country, being principally open downs, with well-shaded channel country along the creeks and well-grassed with Mitchell, Flinders, and other grasses.

Water supplies consist of bores, equipped, with drains, tanks, and dams, and natural supplies in holes in creeks. Further supplies can be obtained by boring at a reasonable depth, and there are good sites for dams.

Other improvements consist of boundary and internal fencing, yards, and huts.

Each selection will require to be stocked to its reasonable carrying capacity with the applicant's own sheep within a period of three years, and proof must be furnished of the financial standing and pastoral or land experience of the applicants.

Free lithographs and full particulars may be obtained from the Land Agents at Winton and Longreach, the Land Settlement Inquiry Office, Brisbane, and the Government Intelligence and Tourist Bureaux, Sydney and Melbourne.

POINTS IN GRAZING LUCERNE.

The chief points to be observed in grazing sheep on lucerne, if the best results are looked for, are:—

Paddocks should be subdivided, so that the size of the paddock is in correct relation to the size of the farm flock.

Sheep should never be allowed to feed on lucerne when it is raining, or both sheep and lucerne are liable to suffer.

Hungry sheep should never be turned on to lucerne, particularly if the growth is sappy.

If sheep are grazed for any time on lucerne alone, a dry pick is essential for the best results. Stock occasionally show symptoms of lucerne sickness when kept on it continuously.

General Notes.

In Memoriam.

PATRICK JOSEPH KENNEDY.

It is with great regret that we record the death on 24th February of Mr. P. J. Kennedy, an officer of the Marketing Branch of the Department of Agriculture and Stock. The late Mr. Kennedy was born at Ipswich, Queensland, in 1872, and was the second son of Mr. and Mrs. Daniel Kennedy, old and well-known residents of the Moreton district. He was educated at the Christian Brothers College, Gregory terrace, Brisbane, and subsequently entered the public service. He enlisted for active service with Queensland Mounted Infantry in the South African War. At the end of that campaign, he returned to Queensland and engaged in business activities on his own account. Soon after the constitution of the Council of Agriculture he joined the staff of that organisation and became closely associated with Mr. L. R. MacGregor, then Director of the Council of Agriculture and now Commonwealth Trade Commissioner in Canada. He afterwards received an appointment in the Department of Agriculture and Stock, which he retained until the time of his death.

In his younger days, the late Mr. Kennedy was a keen sportsman and excelled as a rifle shot, being a member of the Lowood and Brisbane Rifle Clubs. He won many trophies for his skill as a marksman, and in 1910 represented the State in Commonwealth competitions. He was laid to rest at Lutwyche Cemetery on 26th February in the presence of a large gathering, including many who had been associated with him in official and commercial life. The late Mr. Kennedy is survived by his widow (formerly Miss Maud Muller, of Warwick, Queensland), two daughters, and five sons, to whom the deepest sympathy is extended.

Staff Changes and Appointments.

Mr. W. D. C. McNeill, Inspector in Charge, Helidon and Crow's Nest Tick Cleansing Area, and Mr. D. Hardy, Inspector of Stock, have been appointed District Inspectors of Stock, Department of Agriculture and Stock.

Mr. E. A. Green, Inspector under the Diseases in Plants Acts at Wallangarra, has been appointed also an Inspector under the Apiaries Act.

Constables C. C. Francis (Mount Perry) and C. Zillmann (Bundaberg) have been appointed also Inspectors under the Slaughtering Act.

Constable H. P. Gerber, of Chillagoe, has been appointed an Inspector of Slaughter-houses at that centre.

The following persons have been appointed Honorary Rangers under and for the purposes of the Animals and Birds Acts as from the 10th March:—Mr. A. Marshall (manager, Malvern Downs Station, Capella), Messrs. M. A. Martin and B. Anderson (Bundaberg), Messrs. B. R. Beirne, H. A. Muller, and C. O. Sharp (Toowoomba), Mr. F. H. Barlow (City Engineer, Toowoomba), and Aldermen J. Robinson, J. Platz, and F. B. Common (City Council, Toowoomba).

The resignation of Mr. J. C. Wilson as an Agent under the Banana Industry Protection Act at Wamuran has been accepted as from the 10th March.

Open Season for Game.

The Minister for Agriculture and Stock, Mr. Frank W. Bulcock, in announcing the issue of an Order in Council providing for an alteration in the dates for the open season for duck and quail in Southern Queensland for a period of five months from the 14th April, pointed out that the protective period of seven months prescribed in the previous Order in Council extended from the 1st October in each year to the 30th April in the following year, inclusive.

Acting on information supplied from authoritative sources, it was decided that this period might operate somewhat earlier than usual, in view of the fact that ducks and quail were fairly plentiful, especially on the Darling Downs.

Mr. Bulcock emphasised the fact that, although an alteration had been made in the date for the opening of the season, there was no intention to reduce the period of seven months' annual protection, which would apply as hitherto, and would be strictly enforced.

Citrus Levy Regulation.

A Regulation has received Executive approval empowering the Committee of Direction of Fruit Marketing to make a levy on all citrus fruits marketed for the year ending 28th February, 1935.

The levy is at the same rate as that of last year, namely, 5s. per ton on fruit sold for factory purposes, 3s. 2d. per ton on fruit forwarded by rail for other than factory purposes, and one penny per case on fruit forwarded otherwise than by rail for other than factory purposes. The levy may be collected by agents or persons who hold to the credit of growers money on account of citrus sales, or, in some cases, by the Commissioner for Railways, and the method of collection shall be by means of levy stamps obtainable from the C.O.D., which shall be affixed to account sales or credit notes. In the case of citrus fruits sold privately, the grower shall furnish a return of such sales to the C.O.D., and pay the levy due. Carriers of citrus fruits shall furnish a monthly return to the C.O.D. of all fruit carried for market.

The sums raised by the levy shall be expended in the interests of the citrus industry.

Proposed Plywood and Veneer Board.

Following on the presentation to the Government of a petition by producers of plywood and veneer requesting that all plywood and veneer produced in that portion of Queensland south of the 23rd degree of south latitude be declared commodities under "The Primary Producers' Organisation and Marketing Acts, 1926 to 1932," and that a Board be constituted in relation thereto, a notice of intention to make an Order in Council to give effect to the above request has been issued.

A petition for a poll to decide whether this order should be made must be signed by 25 per cent. of the growers of plywood and veneer, and must be lodged by the 23rd April next.

The proposed Board shall be a marketing board and shall consist of ten elected representatives of the growers and the Director of Marketing and an Officer of the Forestry Department. The Board shall be constituted for one year, and growers of the commodities shall be those persons who own plywood and veneer plant, and have produced plywood and veneer for sale. Upon making the order, the commodities shall be vested in the Board as the owners thereof.

The Minister is empowered to appoint an Officer of the Forestry Department to be an additional member of the Board.

Provision will be made in the order that the Plywood and Veneer Board shall have authority to acquire and allocate raw material (including timber) required by producers, and shall receive and allocate to the producers, on a quota basis, as decided by the Board, all orders for the supply of plywood and veneer, and shall control the marketing thereof.

The Board shall also control the appointment and registration of agents in Queensland, the Commonwealth, and in other countries, and shall determine the remuneration of such agents.

Nominations will be received at the Department of Agriculture and Stock, until 23rd April next, for the election of ten growers' representatives on the proposed Plywood and Veneer Board. Each nomination is to be signed by at least five growers of plywood and veneer.

Sugar Cane Prices Boards.

An Order in Council has been issued under the Regulation of Sugar Cane Prices Acts removing all members of Local Sugar Cane Prices Boards who were appointed for the currency of the 1933 crushing season.

The annual elections have now been completed. and the Governor in Council has to-day appointed the Millowners' and Canegrowers' Representatives on the various Local Boards, together with the Chairman of each Board, for the forthcoming season.

Protection of Wage Levels.

A league has been formed in London to urge upon the Government that each section of the Empire must recognise that it is its duty to protect its own wage level, to allow free competition on that level, but to demand an import duty equivalent to any difference between domestic and externally lower costs.

Protection of Native Flora.

For the purpose of effectively preventing the wanton destruction and removal of protected native plants throughout the State, the Department of Agriculture and Stock has sought the co-operation of the Main Roads Commission, and fifty-three officers of the Commission stationed throughout Queensland have been appointed Honorary Rangers under the Native Plants Protection Act.

Strawberry Culture.

March and April are the main planting months for strawberries in Queensland. A pamphlet containing instructions in strawberry culture is now available for distribution on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Canary Seed Board.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, Brisbane, until the 26th April, 1934, for election as Growers' Representatives on the Canary Seed Board for the period as from the 1st June, 1934, to the 31st May, 1935. Two such representatives are to be elected by canary seed growers, and each nomination is to be signed by at least five persons who have grown or have growing canary seed for sale between the 1st June, 1932, and the 31st May, 1934.

De-grading of Bananas.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock, M.L.A.) stated recently that the Chairman of the Banana Industry Protection Board (Mr. H. Barnes) had reported to him that the Board was making inquiries into the reason for the big increase in the number of cases of bananas being de-graded in Melbourne.

The grades in both Victoria and New South Wales are similar to those in Queensland, and the Inspectors in all three States take the same measurements, i.e., from the outside of the curve from the end of the stalk to the butt at the flower end. There has always been a certain amount of marking down in Sydney and Melbourne, and it has been ascertained this is almost invariably due to the faulty or careless grading and packing by growers. As, however, defaulting growers are periodically advised of their errors, it is difficult to understand now why there should be such a big increase in the number of cases of fruit de-graded, instead of a gradual decrease.

Arrowroot Board.

The only nominations received at the Department of Agriculture and Stock, in connection with the election of five growers' representatives on the Arrowroot Board, were from the present members, namely:—

Carl Brumm (Woongoolba).

James Francis Cassidy (Woongoolba).

Alexander Rose (Norwell).

Robert Stewart (Ormeau).

George Rawlinson Walker (Upper Coomera).

These persons will be appointed for a further term of three years.

No Open Season for Opossums.

The Minister for Agriculture and Stock (Mr. Frank W. Bulcock) has called attention to certain unauthorised reports which have been circulated and which would indicate that a decision has been arrived at to declare an open season for opossums during the present year. Mr. Bulcock deprecated any action which might mislead trappers and others interested, and again emphasised the fact that no decision had been made on the matter by the Government.

It must be obvious to all persons interested in the opossum fur trade that oversea market conditions are a primary factor in any decision to open the season and for that reason close touch is kept with the London markets. It is noted that in the September and January sales there was a strong demand for skins of good quality, but those of inferior class were practically unsaleable. In any decision which will have a bearing on the opening of the season, the question of supply and demand must, in the interests of all concerned, and especially the trappers, be carefully studied as there would be no justification to decide in favour of an open season if supplies of suitable skins were not procurable or prices were offering which would not give the trapper at least a reasonable return for his labour and financial outlay.

Mr. Bulcock also drew attention to reports of illicit trapping and warned those who committed breaches of the law by trapping during the period of protection that every effort would be made to cope with these irregularities, and trappers in their own interests are advised that it would be unwise for them to take, what they might consider, a "sporting" risk in attempting to evade the provisions of protective legislation.

Citrus Crop Prospects.

The Minister for Agriculture and Stock (Mr. Frank W. Bulcock) stated recently that reports submitted to him by the Director of Fruit Culture (Mr. H. Barnes) on the prospects of the citrus crop in the various districts showed that the crop for the coming season promised to be an exceptionally good one. The previous forecast, earlier in the season, of a 50 per cent. increase would be fully realised in some districts. In the Gayndah district the crop was well forward and promised to be of good quality and size. The summer crop of lemons was now being marketed and satisfactory prices were being realised. In this district the industry was advancing on sound commercial lines, and growers were making negotiations for the establishment of a Co-operative Packing House, which would add to the good name the district had already built up as a producer of good-quality citrus fruits.

On the North Coast there was every promise of a big crop also. Mandarins were not in heavy bearing, as a severe drop was experienced when the fruit was setting, but nevertheless growers were looking forward to a good harvest. Although a number of new plantings had been made on the North Coast, the total acreage there was not increasing owing to the number of orchards which were yearly going out of production, due to unsuitable conditions.

The Tambourine Mountain district expected to market a record crop this year of excellent fruit. This district, during recent years, had increased its acreage very considerably, and, provided weather conditions were favourable during the blossoming period each year, could be looked to to produce in a few years a considerable percentage of the State's annual citrus yield.

Honey Board.

A vote on the question of the continuance of the Honey Board for a further term of five years was conducted at the Department of Agriculture and Stock to-day with the following results:—

	Votes.
For the Continuance of the Honey Pool	100
Against the Continuance of the Honey Pool	70

The election of members was also taken, and resulted as follows:—

	Votes.
Charles William Edwards (Greenbank, via Kingston) ..	228
Robert Victor Woodrow (Woodford)	196
Henry Edgar Fagg (South Killarney)	195
Owen Norman Tanner (Samford)	184
Roy John Bestmann (Caboolture)	100
Alfred Gambling (Raceview, Ipswich)	97

The first four-mentioned persons will therefore be elected for a term of two years as from the 9th March next.

The retiring members were Messrs. Edwards, Fagg, and Tanner. Mr. J. Schutt did not seek re-election.

Rural Topics.

Diseases of the Udder of Dairy Cows.

Since the udder secretes the milk which is the staple product of the dairy farm, its health is of prime importance to the farmer. Unfortunately it is liable to be affected, with a number of diseases, which may not only considerably lessen the milk production (sometimes permanently), but also may have serious effects on the general health of the animal. The more important diseases affecting the udder are infectious, but by careful attention to sanitary management they may be controlled to a large extent.

Inasmuch as milk forms a very important article of human diet, particularly for children, a considerable responsibility is thrown on the dairyman to supply only a pure, wholesome, disease-free product.

Structure of the Udder.—The udder or mammary glands of the cow consist of two halves, separated along the middle line. Each of these halves is divided into two quarters. The halves are separated by a well-marked partition, but although the two quarters of each side do not communicate with each other, there is no visible division between them. The udder is covered with a soft pliant skin, upon which are fine soft hairs. Hair, however, is not usually present on the teats. The gland tissue itself is arranged in a great number of lobes which communicate with tiny tubes or ducts. These ducts run into larger vessels, and by these the milk secreted in the gland is conducted to a cavity known as the milk cistern, above the base of each teat. Each quarter has a teat through which the milk is drawn during milking. The teats are cylindrical in shape, soft, and elastic to the feel. Each contains a single passage or duct which opens above to the milk cistern and below to the tip of the teat.

The size and texture of the udder varies in different animals and different breeds. An udder which shrinks up after milking (milks out like a glove) is preferable to a large fleshy udder which does not shrink much in size when empty, and which denotes, usually, that the cow is not a great milk producer.

On handling the empty healthy udder the gland should be of the same consistence throughout. There will be a great variation in the actual "feel," depending upon the texture of the udder in the animal under examination, but the texture should be similar right through the organ; no lumps or thickenings should be detected.

Evidence of Udder Disease.—Different diseases affect the udder in different ways. Some affections may attack the skin mainly, others the gland tissue; some diseases make an acute attack on the gland and the symptoms appear suddenly, others are slow-moving in their effect, the changes taking place being gradual. Some of the common changes which occur are:—

(1) The milk becomes watery or thickened, contains minute or larger clots, contains blood or becomes discoloured. It may have an unpleasant smell.
(2) Milk production may be more or less rapidly decreased, or cease altogether.
(3) The skin may show the presence of reddened, sore areas, scab formation, or small pustules.
(4) The udder may be hot, tense to the feel, and painful to handle.
(5) Hard lumps may form in the udder.
(6) The whole of the quarter may become uniformly hard.
(7) The quarter may "waste away" and become useless.
(8) Swellings may occur in front of or behind the udder.
(9) One quarter or more of the udder may die and slough off, leaving a gaping raw wound.
(10) In addition to any of the above, the animal may show signs of general disturbance of health, refusal of food, panting, shivering, and so on.

From the above it will be seen that, although in many cases the changes in the milk or the udder are obvious and cannot be mistaken, in others the changes are gradual and not likely to be detected unless sought for.—A. and P. Notes, New South Wales Department of Agriculture and Stock.

High Speed Porkers.

A leading firm of stock food manufacturers in the British Isles, in emphasising the value of their commercial pig foods, speaks of them as producing high speed porkers. They claim prime porkers reach 120 lb. live weight in twenty weeks, and high-grade baconers 200 lb. live weight in twenty-seven weeks or less. They emphasise, however, that such high speed results can only be maintained when the best materials are used in the most skilful manner and with stock that are well bred and of the best commercial type. The day of the mongrel pig has gone for ever. The only pigs that are profitable in these days are those that are well bred, well fed, and carefully managed. This emphasises the slogan—"Better Pigs for Every Farmer."

Pigs—Grain and Milk.

An overseas contemporary, in discussing the success of the Danish farmer, indicates that Denmark established her pig industry, not on co-operation as so many seem to think, but on her ability to change her agricultural policy to meet new conditions.

When the increased quantities of cheap grain began to arrive from the American and Canadian prairies, Danish farmers, as grain producers, were unable to meet the severe competition. In order to remedy the difficult situation they turned to technical improvement. The surplus export of grain was replaced by a rapidly growing export of animal products, such as butter, bacon, and eggs. The prosperity of Danish agriculture during the past fifty years was based on the Danish dairy industry, bacon production being subsidiary in that it afforded an opportunity of making full use of dairy by-products.

Cheap feeding stuffs would seem to be essential to the successful development of pig production. To be successful the pig must be fed on farm-grown grain, milk and other products, and of these foods, grain, milk, and root crops hold pride of place.—E. J. SHELTON, Senior Instructor in Pig Raising.

Watering of Cows.

Experimental investigations have proved very definitely the value of giving cows free access to water at all times. The U.S.A. Bureau of Dairy Industry investigated this matter in 1931. The tests were carried out in both warm and cold weather, and with high and low producing cows.

The effect on consumption of watering twice a day was compared with results obtained when the cows had free access to water. The cows drank 1.5 per cent. more water when watered twice a day than when allowed to drink at will, and 13.3 per cent. more than when watered only once a day. They produced most, however, when given free access to water, averaging 2.8 per cent. more milk and 2.1 per cent. more butter-fat than when watered only twice a day. Twice-a-day watering as compared with the practice of giving water only once a day gave, on the average, an increase of 1 per cent. more milk and 1.4 per cent. more butter-fat. It was also found that the increase in milk production as a result of more frequent watering was more marked in the case of the good producers than in that of the low producers.

Benefits of Fallowing.

Twelve district societies organised competitions in the western wheat zone of New South Wales last season, and, notwithstanding the unfavourable conditions, the average of the yields of all competing crops was 29¾ bushels per acre—an excellent performance, comments the Chief Instructor of Agriculture, New South Wales, in his report as judge:—

"In such an adverse season as that experienced in the southern and western portions of this division, the production of yields of 24 bushels per acre may be regarded as an achievement, which was made possible by the practice of fallowing. This result should be sufficient to demonstrate that fallowing is the best insurance against drought, and should persuade wheatgrowers that it is essential to successful farming in these areas and encourage them to make it a general practice.

"In every instance the initial cultivation of the fallow was completed by August, and it may be of some significance that the crop produced on the fallow which was ploughed on the latest date exhibited the most evidence of distress in the final stages. The earlier the fallow is ploughed the longer is the land in a receptive condition to absorb any rains that may fall, and not only is there an increase in the amount of moisture conserved, but the other benefits of fallowing are increased, such as control of weeds and disease, the production of nitrates, and the preparation of a good seed-bed."

Protein in the Ration—For Milk Production.

In his report on a competition recently conducted by Camden Haven branch of the Agricultural Bureau of New South Wales, the departmental dairy instructor who acted as judge emphasised the value of protein in the feeding of cows for production. The protein or nitrogenous portion of any fodder mixture, it was stated, was the most expensive one to provide, but it had been very truly said that the secret of milk production lay in the provision of a plentiful supply of protein. Common fodders rich in protein were lucerne, cowpeas, and vetches, and among the concentrated fodders, linseed meal.

"Balancing" a ration meant that the foods were to be mixed in such a way that all the constituents thereof could be most economically made use of by the cow. For instance, saccaline contained a large proportion of carbohydrates—sugar. If fed on a ration of saccaline only, the cow would use only such proportion of the carbohydrates as she required, and the remainder was wasted. To "balance" the carbohydrates, a fodder containing more protein should be mixed with the saccaline, and the quantity of the latter reduced. A suitable fodder would be lucerne hay. Substitutes, however, could be cowpeas, vetches, red and berseem clovers. A crop which was very high in protein and which had not been tried in New South Wales to any extent was the soy bean, a crop which was grown very extensively in the United States.

The cow's natural fodder, and one which naturally provided a balanced ration, was a mixture of grasses and clovers in bloom, and if this could be provided for her all the year round, it would be easily the most economical method of feeding. A start in the right direction was the provision on most of the farms of areas of winter grasses and clovers. If continued and extended into a number of small paddocks on each farm these would be of incalculable benefit in time to come, when it might be possible for paspalum and clover pastures to provide grazing in the summer, with rye and clover pastures for the winter, reserves in case of necessity being provided by the pit silo.

A Point in Pig-Feeding.

If the value of all the food wasted annually in pig-feeding could be accurately estimated, observes a South African paper, it would certainly amount to a very considerable sum. That money would be much better in somebody's pocket than on the muck-heap.

A certain amount of wasted food is inevitable, but a great deal of the waste that occurs might be prevented by a little foresight. Unsuitable troughs are, perhaps, the first and most frequent cause of wasted food. When pigs are fed with slop in troughs which have no rim, a certain amount of food is bound to be pushed overboard and lost.

Food is also wasted when the trough accommodation is not sufficient for the number of pigs, and again when there are no divisions, so that the pigs jostle one another or can run their noses along the bottom of the trough, as they often will. This habit is encouraged when food is mixed too thinly, for this induces the pigs to push to the bottom for the solid matter to be found there. That results in a good deal of the liquid being pushed over and any meal suspended in it is lost.

Cream Quality Affects Butter Quality.

The low prices at present being received by suppliers of cream may prove a temptation to some to be satisfied with a little less than the best possible in the way of quality of the product when it leaves the farm, observes the "Agricultural Gazette" of New South Wales. Producers should remember, however, that upon the quality of the cream supplied depends the quality of the butter that that factory can produce, and that any falling off in butter quality would have a serious effect upon prices, and upon the dairying industry.

Not only does a decrease in cream quality affect the reputation of the output of a factory, but it actually penalises the producers of really high quality choicest cream, by injuring the quality of the butter made from that cream when blended with a cream of lower quality. The larger the proportion of "bare choicest" cream that is used at a factory, the greater the danger of a falling off in the quality of the butter produced.

Though modern methods of manufacture may do a lot towards eliminating undesirable features in cream, the factory should only be called upon to deal with those faults which it is impossible for the producer to avoid.

Lucerne, a Hardy Crop.

The following interesting evidence of the persistency of lucerne under unfavourable conditions appears in a recent issue of the "Agricultural Gazette" of New South Wales:—

"By way of experiment the Department sowed an area of lucerne in 1925 on the property of Messrs. D. and J. Gagie, West Wyalong. The germination was poor, and although the stand was given no after-treatment by way of renovation or top-dressing, and has had to weather abnormally dry and wet seasons, and, furthermore, has at times been subjected to very harsh treatment by being heavily grazed when droughty conditions made other feed very scarce, it has proved to the Department's satisfaction that a lucerne stand will provide good grazing in the Wyalong district for as long as seven years. Given reasonable care and attention, the stand should remain in excellent order, and free of weeds for from eight to ten years.

The stand on Messrs. Gagie's farm was continuously stocked with horses throughout its whole life, except for the six months, May to October, 1926. The fact that any of the plants at all survived this treatment during the long dry spells is proof of the persistency of lucerne under adverse condition of climate and management. Not only did this stand have to survive droughty conditions, but during the first six months of 1931, when 21 inches of rain were recorded, it was under water no less than four times.

"The lucerne on Messrs. Gagie's farm was sown in September, 1925, at the rate of 7 to 8 lb. per acre. Later experience has shown that 4 to 5 lb. per acre sown in the autumn will result in a better stand."

Care of the Milking Herd.

Absolute cleanliness and care at all points are necessary for the ensurance of quality in milk and cream. Following are some important precautions in the care of the milking herd:—

Keep milkers away from weeds. Ordinary food flavours from such fodders as lucerne, silage, &c., can be removed by aeration and cooling of milk and cream on the farm, and pasteurisation at the factory; but strong food flavours or taints, such as from carrot weed, cannot be got rid of.

Clean, fresh, running water is best, and next to it comes good spring or well water pumped into troughs. Water contained in dams, marshes, or stagnant pools is bad, and is swarming with harmful germ life. Milking cows should be prevented from wading into such places, otherwise they bring the contamination into the milking-yard by the mud which clings to their skins. Those in this state should be brushed and wiped, and have their udders washed before milking. The same applies when they have to wade up to their bellies through muddy yards. If this is not done, the dust from the dried mud falls into the milk bucket, and the dirt on the udder and teats oozes through the milker's fingers and mixes with the milk, which then produces fermented and badly flavoured cream.

Milk should be well strained. A filter cloth fitted on top of the gauze of the strainer will greatly help in improving the milk. These cloths should be destroyed or thoroughly boiled for twenty minutes before being used again.

Give the cows high, clean, dry ground to camp on. The infections caught in low-lying, swampy ground and stagnant water cause most unclean flavours and smells in cream and butter, and they are also often responsible for fermented cream and sour milk.

In wet weather scrape the cows with an iron hoop before milking to prevent drips from falling into the bucket. Milk from sick or diseased cows should not be used for human consumption, or for making butter or cheese. The milk from injured teats should be thrown away.

Tribute to the Butter Board.

At the recent Rockhampton Ward Conference of the Queensland Producers' Association, it was moved by Mr. Harding, seconded by Mr. Legh: "That this conference of farmers notes with relief the enactment of the Commonwealth butter marketing legislation, which we consider to be the greatest achievement to date towards the objective of securing for dairymen a return for their services equivalent to that received by other sections of the community for their services; and we record our appreciation of and thanks for the work of our dairying leaders, particularly Mr. Chris. Sheehy (secretary of the Council of Agriculture) and Queensland Butter Board, who have been responsible for the success."

Points for the Inexperienced Poultry Raiser.

The Minister for Agriculture and Stock, Mr. Frank W. Bulcock, stated recently that he had had brought under his notice several cases of buyers of poultry having been duped, and for the benefit of the inexperienced poultry raiser, he had made the following statement:—

"On commercial poultry farms, cockerel chickens that are not required are selected at an early age, usually from four to six weeks, and sold in the auction market. The reason for the sale of the cockerel chickens at this age is due to the fact that most breeders are of the opinion that it would not be profitable to keep them any longer. It is becoming a practice of some dealers to buy these unwanted cockerels and advertise them for sale as purebred White Leghorn chickens, age four to eight weeks. This class of advertisement is misleading. Although the birds offered for sale are chickens, they are cockerel chickens. Inexperienced persons are induced to purchase as the result of this type of advertisement, thinking that they will obtain an equal number of females and males, and as the chickens are partially grown, consider that an added advantage."

Mr. Bulcock further mentioned that this class of chicken came direct from the brooder to the market, that they had not been weaned from the brooder and consequently were at a difficult stage to handle; moreover, that birds of this age would not travel as well as day-old chickens.

There was another type of deception practised on unsuspecting buyers, and that was the sale of culled and discarded hens. It was a common and necessary practice for poultry farmers to cull their flocks, due to the fact that birds become unprofitable as they age. These culls are sold in the market for table purposes, and it is not uncommon for these birds to be bought by dealers to meet the demand resulting from an advertisement. One dealer appeared to operate under more than one name, and had been known to state to a prospective client that he was selling the stock from his brother's farm in a certain locality. Upon investigation, no brother's farm could be traced, but it was ascertained that he had been a constant buyer of culled hens from one auction room.

The Minister considers that this class of business is distinctly undesirable, and warns prospective purchasers against buying so-called chickens on account of their sex and the unwanted hens of commercial poultry farms.

Grade Your Seed Wheat.

It is very important in the sowing of wheat that only graded seed be used. Grading not only removes wild oats and other foreign seeds, but also ensures uniformity. If the size of the seed is uneven the sowing will be uneven, inasmuch as the grain will not run evenly through the cups of the drill.

It must not be imagined that because small grains are sown, weak or poor plants will necessarily result. As a matter of fact, if the smallness of the grain is due to adverse weather conditions during growth, no harm is done—indeed, the crop may be a vigorous one. But if the smallness of the grain is due to the parent plant having been weak or diseased, it is obvious that a good strain cannot result. In order to be on the safe side, therefore, farmers should thoroughly grade their seed before sowing.

Various types of graders are on the market, but it will generally be found that the type equipped with the cylinder and perforated screens is the most efficient, and for all practical purposes the single-cylinder machine is the most convenient. For small quantities of up to, say, 250 or 300 bushels, a hand machine will answer the purpose admirably, but for larger quantities of wheat it is advisable to drive the grader with a small power engine.

Unless experimenting, the wheat-grower should sow only varieties which have proved the best yielders in his district.

Some varieties fulfil a dual purpose, and can be cut for hay or harvested for grain. On the other hand, farmers growing wheat for the chaff market must exercise particular care in choosing suitable hay varieties. Further, in growing for grain the difference between the yields of a suitable and unsuitable variety may be as much as a third of the yield.

In general, the best yielders are those that are able to make use of the full growing period in their respective districts—that is, those that can be sown seasonably.—A. and P. Notes, N.S.W. Department of Agriculture.

Feeding of Pigs.

Much better results would be obtained in pig-farming if closer attention were given to the important question of feeding. The many points which make for successful results must be carefully observed from the time that the pig is born to the time that it is marketed. Unfortunately many pig farmers appear to be under the impression that the pig will thrive under whatever conditions it may be fed and on food which may be actually unwholesome.

The foods available (and there is a considerable choice of pig foods in New South Wales) must be so used that the animal is supplied with adequate material for growth and early maturity. A properly balanced ration is necessary, by which is meant that the nutritive constituents are associated in such proportion as to produce the results sought in feeding with little or no waste. The feeds available on most farms are quite adequate, but the way in which the animals are fed is the cause of many losses of young pigs. Pigs require to be fed from clean vessels and from clean troughs, free from crevices. The trough should preferably be of concrete built into a concrete floor.

The pig is well adapted for the disposal of many waste foods of the household, farm, orchard, and dairy, but unless these foods are in a sound and wholesome condition serious troubles may be caused by their use, and the quality and market value of the carcase may suffer. Of all farm animals the pig responds most readily to generous feeding; the stomach is only small, but the intestines are of great length, indicating great digestive powers, and for these reasons the pig must be fed frequently and at regular intervals.

The value of grazing and pasture crops is becoming more recognised, and when their use is combined with the feeding of maize or other grains good results are obtained. Green feed regulates and tones up the digestive and circulatory systems and keeps the animal in a healthy condition. It has to be recognised, however, that green feed will not entirely replace grain. Skim milk and butter-milk are of great value as pig food, not only when fed by themselves, but more particularly when combined with maize, as they greatly increase the digestibility of the latter and effect a saving of grain. Favourable climatic conditions, plenty of good, clean water, good grazing land, and association with dairying on a small scale are factors in the cheap production of pork.

It is necessary, if the best price is to be obtained, that the pigs should be of the correct type, well fed and topped off before being sent to the market, and the growing conditions should be so arranged that they develop and arrive at the desired weights in a specified time. A system of grading should always be in operation on the pig farm, each grade being kept in its own yard or small paddock. Unless such a system is followed the large pigs do not give the smaller ones a chance, the result being that the latter take longer to get into market condition, with consequent loss to the producer.—A. and P. Notes, N.S.W. Department of Agriculture.

Soil Erosion—Value of Contour Drains.

"Although hill land on the far South Coast (N.S.W.) was not flooded by the recent deluge, in many instances it suffered greater damage than did alluvial land—and damage that, unfortunately, is irreparable," writes an officer of the Department of Agriculture in the current "Agricultural Gazette" of New South Wales. "On nearly every farm, paddocks are to be seen that have suffered 'gullying' and 'sheet erosion,' one being as bad as the other, although the damage resulting from the latter is not nearly as evident as that from the former.

"A striking example of the value of contour furrowing for the prevention of this erosion is to be seen on the farm of Mr. C. N. Squire, at Springvale. On this farm, as hilly as any other in the district, the damage by washing from the rains was practically nil, the reason being that Mr. Squire having realised the value of contour furrowing his country, had carried it out on all his cultivations, and he has now reaped the reward. With all the rain, these single furrows, placed about ½ to 1 chain apart depending on the slope of the land, carried all the water across the paddocks, and did not allow it to go its own course and cause scouring.

"The farmers of the Bega district should make an effort to visit this farm and see for themselves how this recently-introduced method of preventing soil erosion stood up to this severe test. Mr. Squire is every ready to explain the whole operation, from the construction of the home-made level to the completion of the single furrows that do the job. If contour furrowing will stand up to 13 inches of continuous rain, it will stand up to any weather likely to be experienced in this district."

Holding Power of Fruit Case Nails.

One of the problems which confront the users of softwood fruit cases is the tendency of the nails to withdraw from the wood if the case is subjected to rough handling in transit to market. To overcome this rusted nails are often used, while there are on the market special nails claimed to have holding power, such as barbed or jagged nails, twisted or spiral nails, cement coated and sand rumbled nails, and these are used to a considerable extent.

In order to determine the relative efficiencies of the various types of nails available, the Division of Forest Products of the Commonwealth Council for Scientific and Industrial Research recently carried out a comprehensive series of tests. Samples were obtained from the principal nail manufacturers of the Commonwealth, the size of the nail being standardised at 2¼ inches by 12 gauge; and Western Hemlock, by far the most commonly used timber for softwood containers in Australia, was used for the test.

The results (published by Ian Langlands in Technical Paper XI. of the Division) showed that the rusted nail had the highest static (gradually and steadily applied load) holding power, while twisted nails had the highest impact (load applied suddenly) holding power.

Combined composite figures (a straight average of the static and impact figures), considered to be the best expression of the all-round efficiency of the various types of nails, were also calculated, and these showed the twisted wire nail made from square wire to be superior to all others, next in order being the rusted nail and the twisted nails made from grooved wire. With the exception of cement-coated twisted nails, and a certain type of barbed and cement-coated barbed nail, the other types showed no significant improvement over the plain nail.

Lucerne for Grazing.

Some years ago the idea existed that lucerne would only grow satisfactorily on deep, rich, alluvial flats, but to-day it is considered to be one of our best and hardiest pasture plants for cold, as well as dry localities. The advantages of lucerne as a pasture are:—

1. It gives good grazing most of the year and produces rapid growing and very fattening feed.

2. It provides fresh green feed at most periods.

3. It can be stocked heavily with the knowledge that with a spell of a week or two, fresh green feed will again be available.

4. It provides excellent pasture on which to wean lambs or lamb down ewes.

5. Paddocks of lucerne can be kept free of "seedy" grasses.

Not only does lucerne provide succulent feed during most seasons in average years, but, once established, it will supply good picking in droughty periods, responding more rapidly than most pasture plants to even light falls of rain. Its value, either when sown alone for grazing purposes or in a pasture mixture, is rapidly becoming recognised, and it is safe to predict that larger areas will be sown each succeeding year.

Where conditions are favourable, early autumn sowing is recommended, at the rate of 2 lb. to 4 lb. per acre if sown alone, and 1 lb. to 2 lb. if sown as part of a pasture mixture.

Lucerne should not be heavily stocked the first season of its growth, as the plants are not then sufficiently strong to withstand the inevitable trampling. Again, it will not stand continual grazing at any time; and the method should be to put sufficient stock on to eat it down quickly, and then to move them off before the young plants have commenced to shoot. The paddock should be subdivided into small lots for grazing, so that the stock can be moved from one to the other in quick succession. Temporary fences could be erected and moved as required. Rapid feeding off prevents injury to the plants and reduces loss and excessive fouling of the feed.

Top-dressing with 1 to 1½ cwt. of superphosphate per acre should be carried out at least every second year. Apply the fertiliser in August, working it in with a spring tooth or rigid tine cultivator.—A. and P. Notes, N.S.W. Department of Agriculture.

Clean Paddocks—How to Deal with Weeds.

The need for the freedom of paddocks from weeds of all kinds and the value of bare fallowing for the improvement of crops have again been emphasised by the Director of Agriculture (Mr. A. E. Gibson).

Mr. Gibson states that agriculture in Queensland has arrived at a stage where, in very many instances, more up-to-date and scientific methods must be applied. The pioneers who cultivated virgin areas of land received as their recompense crops that were both of good quality and heavy in yield. With the changed conditions, and because also of the low prices given for commodities, areas which in the earlier days gave comparatively good returns to the growers are now failing to give yields commensurate with those of the past, and, often, by no means satisfactory.

In addition to that many of the areas are weed infested, and Mr. Gibson says that the farmer who expects to get a return at all proportionate to the amount of work and capital involved must now give his attention urgently to the question whether his methods should not be amended and improved.

In the opinion of the Director, the first consideration is, perhaps, the cleanliness of the paddocks—that is, their freedom from weeds of all kinds. These can be eradicated only by cultivation; sometimes, by the use of grazing animals, and it is advocated that where it is possible to turn weeds into money by this means, that should be done. In this way the weeds are not only checked, but a valuable fertilizing influence is obtained from the grazing of the cattle.

Bare fallowing, Mr. Gibson also explains, is one of the greatest aids to weed eradication, and although farmers complain that they cannot afford to have paddocks lying idle through a full season, when those paddocks are cultivated at, or before, the beginning of the rainy season, they must consider whether it is a payable proposition to get the paddocks cleaned up and thus improve their subsequent crops, or whether they will continue to apply the same slovenly methods—methods which, so often, have ruled for several past decades.

Assuming that the grower has cleaned up his paddocks by the means suggested, it is, of course, a vital essential that only seed which is known to be free from all foreign seed should be sown. Mr. Gibson is emphatic on the point that the expenditure of a shilling or two more per bushel, when graded seed is in the balance, is money well spent. Clean paddocks are thus additionally assured.

Where wild oats are a pronounced difficulty it is possible that bare fallowing will not, in one season, secure the desired result, but the continuance of the fallowing, or the growing of a crop which requires inter-row cultivation, will go far in removing any volunteer growths of this character that remain.

Mr. Gibson says that the loss to Queensland wheatgrowers alone by the inclusion of wild oats, if it could be stated in figures, would be a staggering revelation to those producers who consider that wild oats can easily be cleaned from the resultant grain. They forget that buyers take the presence of the oats into consideration when fixing values, and therefore allow a lesser price for the wheat.

Canary seed-growers are deeply interested in the question of clean areas, as they know from experience that the cleaning of the seed, which is forwarded to the Canary Seed Board, is, in 98 per cent., if not in 100 per cent., of the cases, absolutely necessary before it can be classed as a merchantable article complying with the requirements of the Pure Seed Act. Here again farmers incur an overhead cost which can be largely reduced, and, the Director adds in conclusion: "It is to the attention of these growers that these comments are chiefly directed."

Butter Board Commended.

At the annual meeting of the South Burnett Co-operative Dairy Association at Murgon, the chairman, Mr. S. A. Heading, speaking on price stabilisation and an Australian price, said (vide "The South Burnett Times"):—"There is no question about it, Queensland leaders in the industry have done wonderful work in bringing about this position. Had it not been for Queensland leaders, it would not have come about. Mr. Chris. Sheehy has done wonderful work and has been responsible in a great measure for the formulation of the scheme. He moved a vote of thanks and congratulation to the Butter Board and Mr. Sheehy; they certainly deserved commendation." Mr. Mallon seconded the motion, which was carried unanimously.

Forage Poisoning—Care Necessary in Humid Weather.

Quite recently serious mortality from "botulism" or forage poisoning occurred among horses in the south-western district. Forage poisoning may be defined as a disease caused by eating foodstuffs which have become poisonous (toxic) through the growth in the fodder of a particular microbe, *Bacillus botulinus*. Horses are most commonly attacked, because of all classes of stock they are most commonly fed on prepared fodder, though cases in cattle are by no means uncommon, and even sheep and pigs may be affected at times.

This microbe is what is known as a saprophyte; that is, a microbe which may be found in soil, dust, or water, and ordinarily lives therein, gaining its nutriment from dead (decomposing) vegetable material. Being in the soil, the microbe easily gains access to such fodders as hay, chaff, and silage, per medium of the dust raised from the surface soil. It then requires suitable conditions of moisture and warmth in order to multiply, being in this matter much like a seed. This microbe is, of course, microscopic, and even when multiplying in fodder does not produce any recognisable changes.

Conditions which favour its growth also favour the growth of other micro-organisms, particularly moulds, and thus we frequently find it growing in mouldy fodder. Fodder which is simply mouldy, however, does not induce the disease we call forage poisoning, unless this particular microbe has been growing in and has produced its characteristic poison in such fodder.

An acute type of the disease follows where a large quantity of poison (toxin) has been absorbed. Characteristically its onset is sudden and its course rapid. Careful observation will reveal listlessness, slight inco-ordination in gait, and clumsiness in eating. Then follow the typical symptoms of "paralysis" of the tongue, and the muscles which perform the act of swallowing, salivation being marked at this stage. Following this paralysis the animal loses co-ordination of the limbs, and usually soon goes down. This may, in fact, on account of the non-observation of earlier symptoms, be the first thing noticed in very acute forms of the disease. There are no manifestations of pain, but the animal struggles ineffectively to regain its feet. Affected animals may lie on the ground for one to three or four days, depending upon the amount of toxin that has been absorbed. Finally, however, death supervenes, the animal being conscious almost to the end.

In the chronic form, termed "sleepy staggers," the animal is able to swallow small quantities of food provided it is moist, but has great difficulty in swallowing dry food. Mastication is extremely slow, and a proportion of the food drops from the mouth. Animals suffering from this form may live for weeks and gradually waste away, the abdomen assuming a pronounced "tucked-up" appearance.

This is another of those diseases in which the old adage, "prevention is better than cure," holds good. At the present time there is no method that can be relied upon for the successful treatment of affected animals, and stockowners should, therefore, keep the following points in mind when feeding:—

Foodstuff in which the microbe is found is usually mouldy.

Warm summer or autumn rains falling on fodder, followed by warm weather, may be responsible for the growth of the poison-producing microbe.

Of the several foodstuffs, that most prone to mould, e.g., silage, should be carefully guarded from the conditions which favour mould growth. Mouldy silage should not be fed on account of this risk, though not all mouldy silage is poisonous.

Should such damaged fodder overlie sound fodder, any toxin produced in the damaged fodder is liable to be washed through to the sound portion by rain.

Since there is not any means of determining which fodders are and which are not poisonous, one should, as far as possible, see (*a*) that only sound fodder is fed; (*b*) that where fodder is badly damaged, such damaged portions are burnt; and (*c*) that in order to minimise loss of fodder, proper care is taken in the protection of stacks, &c., from the effects of wet weather, and also the attacks by mice, since these are also likely to result in the growth of the microbe.—A. and P. Notes, N.S.W. Dept. Agric.

The Most Important Labour of Man.

Let us never forget that the cultivation of the earth is the most important labour of man. Unstable is the future of that country which has lost its taste for agriculture. If there is one lesson in history which is unmistakable, it is that national strength lies very near the soil.—Daniel Webster.

Progress in the Dawson and Callide Valleys.

"Agricultural development in particular, both in the Dawson Valley and Callide Valley Areas, has made very noticeable progress since my last visit to those parts of the State in 1930," said Mr. T. L. Williams, M.L.A., on his return from a recent visit to those areas and the Upper Burnett, in company with the Minister for Lands (Hon. P. Pease), who was paying his first official visit to those districts.

Particularly did this apply to the Theodore Irrigation Settlement Area, added Mr. Williams, where the majority of settlers were a happy and contented lot, and were gradually overcoming the initial difficulties that had been brought under his notice from time to time, when, on previous visits to the settlement in a journalistic capacity. The variety of crops being grown had extended, and, though the great problem of finding suitable and adequate near-by markets for the products grown had not been entirely solved, many individual settlers—the more self-reliant and progressive in spirit and methods, in particular—were in a position to place most of the output from their holdings, chiefly in Northern and Western centres, at prices showing reasonable profits, despite the generally low prices maintaining from time to time for the products grown—tomatoes, onions, pumpkins, eggs, chaff, and fodders, &c. Methods adopted in farming also showed a decided all-round improvement.

Dairying all along the Dawson Valley and Callide Valley branch lines had made wonderful strides during the past few years, he continued, and already the Wowan branch factory of the Port Curtis Co-operative Dairy Association, Limited, had well over 600 direct district suppliers, and a turnover of approximately 100 tons of butter a month at present. So great, in fact, has been the progress in the dairying industry in the Callide Valley Area alone, that a strong movement is afoot to secure the erection of a further branch factory of the company at some central point along the Callide Valley branch line, to meet the convenience of settlers engaged in dairying pursuits in that area alone.

Cotton was still one of the main crops grown, however, for which, of course, the district soils are so eminently suited in every way. In the Theodore Irrigation Settlement Area, almost every settler engages in the growing of cotton to a greater or lesser extent (both in the irrigable and the non-irrigable sections). The total area under that particular crop this season is estimated at approximately 1,500 acres, and in most instances, on present appearances, a record crop is anticipated.

Throughout the entire length of the two valleys in question, the total area under cotton this year will run into many thousands of acres, and as the season has been the most favourable for a number of years past, growers are confident of a record yield in most instances. Plants are flowering well and bolling freely, although in a number of places visited by the party rain was badly needed to promote and develop the young bolls. Shedding of the top squares, owing to lack of rain at the right moment, was noticeable in several parts of both districts, but given rain within the next week or two, further shedding of the middle and lower squaring systems would be arrested, and good general yields result, despite present unfavourable seasonable conditions referred to in the localities affected.

Feeding of Brood Sows.

At no season of the year is the feeding of the brood sows as important as it is during the humid weather of wet seasons and during the summer and early autumn months when weather conditions are usually unfavourable for taking necessary exercise, and when there is a tendency for the animals to seek a cool spot and spend most of the time lying about. Such a tendency is exaggerated when the animals are overfat and heavily fed, and especially when the food is of a heavy bulky nature. For best results brood sows should be kept in medium breeding condition, and especially at the time the sow is mated it is important that she be not overfat. The use of properly balanced rations is important, and the sow should be kept in good healthy condition by the free use of succulent green food and by being compelled to do a certain amount of foraging for her own living. Sows need plenty of clean drinking water, some mineral matters like burned corn cores, burnt or charred bones, a lump of rock salt to lick and regular and sufficient meals. It is better to have sows in medium breeding condition, for overfat sows are invariably clumsy and inactive at farrowing time and they rarely make a good job of suckling their young pigs. It is important that the food be appetising and succulent in order that the digestive tract be maintained in healthy condition, for constipation and other disorders of the bowels are disastrous and are responsible for loss of many valuable animals each year. If the sows are worth keeping at all they are worth caring for properly, and no effort should be spared to give them all the attention possible.

The Home and the Garden.

OUR BABIES.

(Issued by the Queensland Baby Clinics.)

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

A TRAVELLING padre in Central Australia has recently published two interesting books of his experiences in his vast but scantily populated parish. These are full of true yarns showing him to be an acute but sympathetic observer of human nature, with a strong sense of humour. One of them deserves quotation.

THE BABY AND THE COCKATOO.

The boarding-house was presided over by a young woman lately come from one of the big cities, and she had ideas of her own, which were not in accordance with the ways of the bush. She was an excellent cook and a good housekeeper, but her ignorance of many important things was abysmal. What she lacked in knowledge she made up in self-satisfied assurance. Consequently few offered her advice.

This young married woman had a baby. The baby had a small undernourished body and a loud and continuous wail. There was also a cockatoo, which, getting such frequent lessons, learnt to imitate the baby's wail to perfection; so much so, that when the baby and bird were at opposite ends of the house, and the mother in between, she was quite unable to distinguish between the infant and the bird. This, to say the least of it, was distracting, and caused her much unnecessary running about.

At last in desperation the mother took the baby across to Granny McGill.

Oh, Granny! I don't know what's the matter with the baby. I'm afraid she's fearfully ill. She cries and cries and nothing will pacify her. I'm sure she's sick.

Sick! Fiddlesticks, woman! replied Granny, tartly; all that's wrong is that you're ignorant and the baby's hungry.

But she can't be, Granny. I feed her regularly.

H'm! sniffed Granny. What do you give it?

Why, I give her a teaspoonful of condensed milk in a cup of warm water three times a day.

The old lady stared at the mother unbelievingly. A teaspoonful of condensed milk three times————. She broke off in disgust. Here give me the child. I'll teach you how to feed it, and muttering something about ignorant fools having the care of babies, set about preparing an adequate meal for the child. Half an hour later, while the contented babe slept peacefully on her ample lap, Granny gave the younger woman some plainly expressed advice.

The chastened mother took the sleeping baby and went home, and it became noticeable that as the cockatoo dropt the wailing for want of an example, the young woman became less opinionated and sought advice when she needed it.

We do not think the baby, who was being slowly starved, appreciated the humour of the situation. Lest some of our readers may draw a wrong conclusion, we must warn them that more babies cry from overfeeding than from underfeeding. These are not being starved, but are in constant torment from overloaded stomach and bowels. Being stronger than the starved babies, they cry much more loudly, and their mothers always think they are not getting enough.

This capable young woman from the big city had received a good State education. There must be something wrong with an education that turns out young women so unfitted for life.

RHUBARB PROPAGATION.

RHUBARB can be reproduced from seed or by subdividing the old plants. There are certain advantages to be gained from both methods, writes a departmental instructor in vegetable growing in the New South Wales "Agricultural Gazette." rhubarb is open pollinated, and unless care is taken in plant selection, a good deal of cross pollination takes place. Commercial seed is usually mixed in character, with the result that the commercial stalks are not uniform. It has been found, however, that rhubarb usually gives much quicker and heavier yields when grown from seed. On the other hand, if the crop is reproduced from a subdivided crown, a crop uniform in character will be produced, and this type of reproduction is less laborious and more reliable than the seed method.

Being a heavy feeding crop, rhubarb demands an abundance of readily available plant food and soil moisture. The crop does best in a free-working alluvial loam, which is well drained. Commercial growers obtain excellent results by digging into the soil up to 100 tons per acre of organic manure, and later force-feeding the crop with artificial fertilisers. Although trials have not been carried out with rhubarb, the indications are that a mixture of blood and bone two parts, superphosphate two parts, and sulphate of ammonia one part, at 10 cwt. per acre, would be the best fertilizer mixture to use. When the crop starts to "pull," the quality of the following stalks can be improved by top-dressing with liquid organic manure.

In the intense culture areas around Sydney, the most successful growers produce rhubarb by the seed method. Their practice is to force the growth, "pull" heavily and destroy the crop at the end of the season. When grown on a wider scale the "split" crown system of propagating is used. The crop is forced, "pulled" heavily for a period, but allowed to develop mature leaves in order to allow the crown to recover for the development of workable stalks at a later date.

The marketing of rhubarb calls for a good deal of attention to detail if the best prices are to be obtained. In the first place, leaves which are damaged and turning brown, or those with split stems, should be discarded. The stalks should be sorted into various grades, according to their length, colour, and diameter. The best prices are always realised for large thick stems of a red colour.

The method of marketing is to pack the stems into bundles, which are rectangular in cross sections; these are made by packing in a small frame 5 inches wide. It will often be found that some of the best stems are bent and cannot be packed when fresh. Experienced growers usually allow these bent stalks to remain in the sun until they become supple, and, after packing, the stems are placed in water, where they quickly regain their crispness and freshness.

The best varieties are Ruby Red, Emu Plains Red, and Tops Winter.

A UTILITY GARDEN.

Possibilities of Establishment in Dry Districts.

In choosing as the subject of his paper the establishing of utility gardens in dry districts, said Mr. W. A. Ellis, at a meeting of the Euratha branch of the New South Wales Agricultural Bureau, he had had in mind the importance of vegetables in the diet and the difficulty in obtaining supplies. Food for the body, however, was not man's only need, and no such garden could be regarded as complete without flowers.

"Too many of us are inclined to think in terms of wheat and wheat only," observed the speaker. "Take a journey by road from here in any direction you please, keep your eyes open and notice the homes you pass. You will find in a few instances a well-kept garden, flowers blooming, a plentiful supply of fresh vegetables, and the refreshing green of fruit trees and shelter belts. In a few cases the owner has become discouraged for some reason or other, and there is just the shadow of what might have been a decent garden. But in far too many instances you will see a house dumped in a bare paddock; no attempt has been made to grow a few flowers or vegetables, and there is not a living tree in sight.

"There is no excuse, however. We have the soil, which is capable of growing almost anything. Stable manure is available in tons, when it is not allowed to blow away. Water is rather a difficult problem, but one which can be overcome. The only other requirements are a little energy and foresight on the part of the farmer and his family."

Orchard Notes for May.

THE COASTAL DISTRICTS.

IN these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become speckled or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally as important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ inches in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one-sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

CLEAN up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place, as, if delayed till the pruning has been finished, the land is apt to dry out.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not*

vines, as the later vines are pruned in the season the better in the Granite Belt district, as late-pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and, when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

Farm Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late-maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING FEBRUARY, 1934, AND 1933, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.,	No. of Years' Records.	Feb., 1934.	Feb., 1933.		Feb.,	No. of Years' Records.	Feb., 1934.	Feb., 1933.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	10·35	33	18·80	19·22	Clermont	4·24	63	6·13	3·84
Cairns	15·58	52	22·75	32·75	Gindie	2·72	35	0	0·53
Cardwell	16·79	62	12·96	17·74	Springsure	3·92	65	3·56	0·79
Cooktown	13·63	58	21·42	28·60					
Herberton	7·74	48	19·07	13·27					
Ingham	16·02	42	16·69	18·17					
Innisfail	22·36	53	28·45	41·68					
Mossman Mill ..	17·46	21	33·95	26·46	*Darling Downs.*				
Townsville	11·11	63	14·19	10·03					
					Dalby	2·86	64	4·42	2·96
Central Coast.					Emu Vale	2·56	38	2·46	1·52
					Hermitage	2·50	28	0	2·13
Ayr	8·86	47	12·57	7·89	Jimbour	2·64	46	4·48	2·59
Bowen	8·65	63	12·69	9·67	Miles	2·71	49	4·82	1·88
Charters Towers ..	4·40	52	7·02	6·34	Stanthorpe	3·21	61	2·53	1·40
Mackay	11·39	63	11·76	19·86	Toowoomba ..	4·50	62	10·88	2·58
Proserpine	11·93	31	14·22	12·68	Warwick	3·08	69	3·35	2·02
St. Lawrence ..	7·79	63	11·76	1·86					
South Coast.									
					Maranoa.				
Biggenden	4·33	35	11·29	1·85					
Bundaberg	6·40	51	19·26	4·90	Roma	2·93	60	3·60	0·98
Brisbane	6·41	83	16·16	2·44					
Caboolture	7·74	47	16·95	3·62					
Childers	6·55	39	21·54	4·15					
Crohamhurst	12·95	41	18·11	4·08					
Esk	5·52	47	8·96	3·93					
Gayndah	4·21	63	8·58	1·71					
Gympie	6·66	64	18·83	3·85	*State Farms, &c.*				
Kilkivan	4·88	55	12·91	1·39					
Maryborough ..	6·65	63	21·16	5·38	Bungeworgorai ..	2·15	20	3·62	0·83
Nambour	9·60	38	15·62	4·65	Gatton College ..	3·45	35	0	2·89
Nanango	4·12	52	5·45	2·44	Kairi	9·76	20	14·51	17·73
Rockhampton ..	7·68	63	16·27	1·67	Mackay Sugar Experiment Station	10·39	37	9·28	20·92
Woodford	8·50	47	13·21	3·70					

GEORGE G. BOND, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—FEBRUARY, 1934.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.		Deg.		Deg.		Points.	
Cooktown	29·80	86	74	94	5	70	5	2,142	25
Herberton	..	77	64	86	5	60	5, 6	1,907	21
Rockhampton	29·91	87	71	97	4	66	21	1,627	10
Brisbane	29·97	83	67	93	4	62	10	1,616	10
Darling Downs.									
Dalby	29·94	85	63	92	15, 25	55	8	442	8
Stanthorpe	..	78	57	85	15	48	4	253	9
Toowoomba	..	77	61	85	15, 4	52	4	1,088	9
Mid-interior.									
Georgetown	29·82	89	71	96	8	66	1, 2, 3	1,172	14
Longreach	29·85	94	69	105	6	64	21	190	5
Mitchell	29·91	89	64	97	16	54	5	311	7
Western.									
Burketown	29·80	89	75	101	5	67	2	314	11
Boulia	29·81	96	74	105	8	67	20	732	3
Thargomindah	29·85	96	72	104	25, 28	63	10	63	6

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	April, 1934.		May, 1934.		MOONRISE. April, 1934.	MOONRISE. May, 1934.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·2	5·50	6·19	5·19	6·17	6·27
2	6·3	5·49	6·20	5·18	6·55	7·27
3	6·3	5·48	6·20	5·18	7·41	8·31
4	6·4	5·47	6·21	5·17	8·35	9·37
5	6·4	5·46	6·21	5·17	9·35	10·44
6	6·5	5·45	6·22	5·16	10·39	11·48
7	6·6	5·43	6·22	5·16	11·45	a.m.
8	6·6	5·42	6·23	5·15	..	12·54
					a.m.	
9	6·7	5·41	6·23	5·14	12·53	1·57
10	6·8	5·40	6·24	5·13	1·57	2·56
11	6·8	5·38	6·24	5·13	3·1	3·55
12	6·9	5·37	6·25	5·12	4·4	4·53
13	6·9	5·36	6·25	5·11	5·4	5 55
14	6·10	5·35	6·26	5·11	6·3	6·55
15	6·10	5·34	6·26	5·10	7·3	7·51
16	6·11	5·33	6·27	5·9	8·6	8·45
17	6·11	5·32	6·28	5·9	9·5	9·36
18	6·12	5·31	6·28	5·8	10·1	10·23
19	6·12	5·30	6·29	5·8	10·53	11·3
20	6·13	5·29	6·29	5·8	11·43	11·37
					p.m.	p.m.
21	6·13	5·28	6·30	5·7	12·28	12·9
22	6·14	5·27	6·30	5·7	1·6	12·39
23	6·14	5·27	6·31	5·7	1·39	1·7
24	6·15	5·26	6·32	5·6	2·11	1·37
25	6·15	5·25	6·32	5·6	2·40	2·10
26	6·16	5·25	6·33	5·5	3·10	2·44
27	6·16	5·24	6·34	5·5	3·41	3·24
28	6·17	5·24	6·34	5·4	4·14	4·12
29	6.17	5.23	6·35	5·4	4·51	5·10
30	6·18	5·22	6 35	5·3	5·35	6·14
31	..	..	6·36	5·2	..	7·23

Phases of the Moon, Occultations, &c.

7 April	☽ Last Quarter	10	48 a.m.
14 ,,	● New Moon	9	57 a.m.
22 ,,	☾ First Quarter	7	20 a.m.
29 ,,	○ Full Moon	10	45 p.m.

Perigee, 7th April, at 9.12 p.m.
Apogee, 21st April, at 11.42 p.m.

Mercury will be at its greatest elongation, 28 degrees west, on 2nd April.

Saturn will be in conjunction with the Moon on the 10th at 6 a.m., an hour earlier the Moon will be about its own diameter west of Saturn; both will be near the border of Capricornus and Aquarius and about half-way to the meridian. The more brilliant planet Venus will be visible in the coming daylight about 7 degrees further east and will be occulted by the Moon about 4 hours after both have gone over the western horizon.

As Mars will be in conjunction with the Sun on the 14th it may be said to have left the evening sky during this month.

On the 16th Venus will be at its greatest elongation, 46 degrees west of the Sun, and will be more than half-way to the meridian at Sunrise.

The conjunction of Jupiter with the Moon, on the 28th, will occur at midday when both are high up (two hours west of the meridian.)

Mercury rises at 3.56 a.m. and sets at 4.36 p.m. on 1st April; on the 15th it rises at 2.40 a.m. and sets at 3.20 p.m.

Venus rises at 2.37 a.m. and sets at 3.21 p.m. on the 1st; on the 15th it rises at 2.40 a.m. and sets at 3.20 p.m.

Mars will set 11 minutes after the Sun on the 1st, with the Sun on the 14th, and one minute after it on the 15th.

Jupiter rises at 6.15 p.m. and sets at 6.47 a.m. on the 1st; on the 15th it rises at 5.14 p.m. and sets at 5.44 a.m.

Saturn rises at 2.31 a.m. and sets at 3.41 p.m. on the 1st; on the 15th it rises at 1.41 a.m. and sets at 6.51 p.m.

Jupiter, which will be in opposition to the Sun on the 8th, will rise as the Sun sets and set as the Sun rises, if we ignore the more exact changes per second which will take place every moment, owing to the velocity, 8.1 miles per second of Jupiter and 18·5 miles per second of the Earth.

Mercury's path will be in Aquarius and Pisces; that of Venus from the border of Aquarius to the border of Pisces; Mars from Pisces into Aries; Jupiter will continue retrograde motion in Virgo, away from Spica; Saturn in Aquarius from Right Ascension 21·49 to R.A. 21·58.

6 May.	☽ Last Quarter	4	41 p.m.
13 ,,	● New Moon	10	30 p.m.
22 ,,	☾ First Quarter	1	20 a.m.
29 ,,	○ Full Moon	7	41 a.m.

Apogee, 19th May, at 5.54 a.m.
Perigee, 31st May, at 5.12 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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